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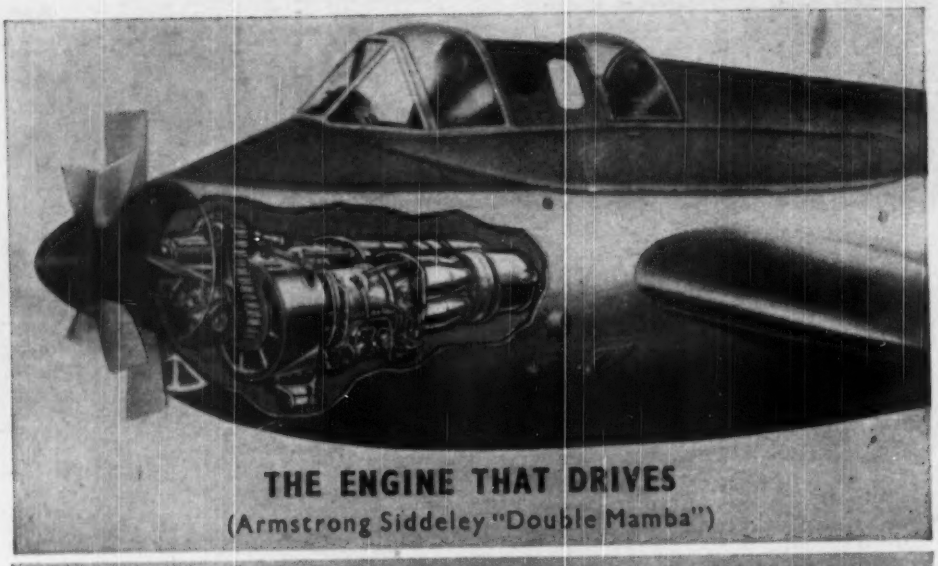

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First Aeronautical Weekly in the World

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In this issue:

Pilgrims by Air - - - 162
Research into Rubber - 171
Mixed Cargoes - - - 173
Livingstone's New Airport - - - - - - 175
S.A.A.F. - - - - - - 178
Design of Tailless Aircraft 179

America's Outposts

THERE are now a greater number of first-line American aircraft in this country than at any time since the war. The statement that these American squadrons are here for training occasionally gives rise to sceptical smiles from the less responsible members of the community, but this is, in fact, the case. "There is no hidden purpose behind the presence of American bomber groups in this country," the Secretary-of-State for Air said when visiting some of their crews last week. We are glad he took the opportunity to stress this point. The presence of the Americans in our country is a clear indication that Western European commitments are being taken most seriously, and that the U.S. Air Force intends to be ready to meet them. Flying conditions here are very different from those in America, and crews require operating experience in this part of the world.

To suggest that the American Air Force units are here with an aggressive intent is untrue and, to those who understand the outlook of the British and American people, ridiculous. Nevertheless, their potent presence will be recognized as a strong deterrent to any aggressor, and at the same time an encouragement, especially to small allied nations who fear for their independence. This country welcomes them and the opportunity afforded for closer co-operation in training and exercises.

Some 70 Thunderjets from South Carolina are the latest additions to United States forces in England, and, with the Shooting Stars already based in Germany, this brings the total of American jet fighters in Europe to more than 150. The Thunderjets (F-84s), flown across the Atlantic by the northern route, are long-range fighter-bombers which differ in several important respects from typical British intercepters. They are capable of taking on fairly long-range escort duties, and in this connection it may be recalled that flight-refuelling tests were carried out in this country some months ago with examples of this type of aircraft.

In confirmation of Mr. Henderson's "no hidden purpose" statement is the fact that free release of information regarding total numbers of U.S. aircraft and men, and of their locations in this country, is permitted. The Prime Minister, in the House of Commons last week, quoted figures for the three bomber groups as 10,000 men and 180 aircraft, and to these have been added the one fighter group. They are based in East Anglia and Kent and groups normally stay for three months.

Beyond the Call of Duty

THREE times in recent weeks British test pilots have proved their mettle in perilous circumstances. By refusing to abandon precious fighter prototypes, at least one of which is reputed to be insured for a six-figure sum, they have earned the admiration and gratitude of the whole industry. Wade of Hawker, Derry of de Havilland and Colquhoun of Supermarine have set an example of courage and resourcefulness matching many valorous deed of war. We are well aware that praise in these terms is embarrassing—even distasteful—to these worthies, who themselves would probably admit only to having the proverbial digit a shade further extracted than usual; but it is surely deserved by such deeds as setting the Hawker P.1081 down on one main wheel, landing the Venom with a dead turbojet, and bringing an Attacker safely home with an outer wing panel folded vertically. Colquhoun's George Medal citation for the last-named exploit appears on page 166.

Misguided pens and misdirected movie-cameras have vested the profession of test pilot with a good deal of shoddy "glamour." The truth is that such men bear little resemblance to the hell-diving, hell-raising film portrayal (except, we may observe, in cast of countenance!) and anyone privileged, as we are ourselves, to know them is impressed as much by their intellect as by their skill. They are, without exception, flying enthusiasts. There is in their make-up a strong streak of what might be described as schoolboy inquisitiveness and, of necessity, a more than superficial grasp of modern aerodynamic problems. These men are the salt of the earth, and the present seems to be an appropriate time to put this fact on record.

PILGRIMS BY AIR

To Mecca in the Modern Way: A Pilot's Impressions of a Specialized Type of Charter Work

By Capt. R. C. O. LOVELOCK

Muslim pilgrims, wearing the prescribed garment, after disembarking from a charter aircraft—an Airwork Viking—at Jidda.

EVERY year the world of Islam is stirred by the impulse of the *Haji*, or Pilgrimage to Mecca, which every good Muslim has to try to carry out once in a lifetime. In our minds the journey has usually been associated with suffering and danger; we have been influenced, perhaps, by Conrad's account in *Lord Jim* of the overcrowding and shameful abandonment of pilgrims aboard the S.S. *Patna*, or the ambush and pillage of *haji* caravans by tribes in the Arabian desert as experienced and related by Sir Richard Burton. It appears, however, that the credit accruing to those who take part springs mainly from their devotional exercises at the Holy Places, and is not intrinsically connected with any hardship or peril endured on the route. It is, therefore, not surprising that many well-to-do Muslims of the territories more distantly situated from the Hejaz now prefer to make the pilgrimage by air and thus eliminate many of the factors which might otherwise detract from a purely religious experience.

Pilgrims of all creeds and followings like to band themselves into companies on their travels, both for mutual protection, and because a spiritual experience is intensified when those taking part are known or related to one another and united under an appointed leader. Thus it is an advantage to be able to offer a complete aircraft for the *haji*; but an even greater asset of the charter enterprises, with their inheritance of the free English trader's genius for adaptability, is that they are the most able and willing to suit the special air requirements of the Muslim pilgrimage. The Koranic injunctions governing the conduct of the *haji* are unalterable; any compromise must be on the part of the carrier. Above all, the greatest need is to eliminate any chance of delay on the route; even the least sophisticated Muslim passengers, travelling in a sublime perfection of *Islam* or "submission to the Will of God," and having none of that premonition of disaster which is often characteristic of Europeans on their first flight, are inconsolable when delayed, imagining their endeavour to be the prey of every malignant interference.

There is no airfield at Mecca itself, less on account of the unsuitable terrain nearby than from the need to exclude all Unbelievers from even the precincts of the Holy City. Pilgrims are required to make the last part of the journey, in a special garb, by road. They must enter the city by certain gates and before sunset. For hundreds of years the Red Sea port of Jidda has been the disembarking point for pilgrims who have come by ship and dhow. It is 45 miles from Mecca, and now a great airstrip has been built there for this new purpose. Mecca, and the other forbidden city, Medina, where the Prophet is buried, are each protected from air scrutiny by a prohibited area of thirty miles radius.

It happens, fortuitously, that the independent Muslim states which insist upon being served by their own airlines are mostly situated in the Levant and those other parts of the Middle East which are closest to the Hejaz, whereas the long, worthwhile hauls are from lands under British rule or where British is still the predominant European influence. The Muslim communities in both East and West Africa are served by British lines, whilst in Pakistan, a wholly Muslim State, we are admitted to a large participation in the pilgrim trade. In view of the over-riding necessity to eliminate all chances of delay, probably Pakistan, as a starting point for the air *haji*, has most to recommend it from the operator's point of view.

The flight to Jidda from Karachi is made from east to west through thirty degrees of longitude, which results in a gain of two hours in local time. The whole geographical area through which this passage is made is held by the Mohammedan faith, and thus ensures that if the passengers have to disembark they will be treated sympathetically because the purpose of their journey will be understood. At the same time it should be borne in mind that the aviation business is often in the hands of an alien race in these countries. On one occasion, when the writer's passengers were mostly Muslim ladies, he was offered accommodation for them in some staff bachelor quarters —so many bodies, so many beds; perhaps it was more through bureaucratic unimaginativeness than any intention to provoke mischief. The track lies north of the ordinary limit of monsoon rains, and the demands of the schedule, to allow a convenient E.T.A. at Jidda, will admit the two natural hazards being crossed in daylight. These are the mountains in Oman, which rise to 10,000 feet, almost out of the sea, and the desert of Central Arabia. Finally, in view of the precautions which are taken against infectious diseases at Jidda it is well to be free of the complications arising through having come from the yellow-fever area.

The pilgrims' requirements are simple but rigid; perhaps the greatest is for the courtesy which is traditional amongst Eastern peoples and which should surely be extended to people who are undergoing an experience to which they have looked forward for many years. In this connection it might be added that it would be gravely misunderstood for anyone to address a Muslim woman direct, even with the most chivalrous intentions. No particular food is specified on religious grounds, but on account of the strict Mohammedan denunciation of all kinds of alcohol and pork, it is advisable to remove the bar stock altogether, and ensure that ham sandwiches, if carried for the crew, are not allowed anywhere near other food or drinking vessels. The most acceptable food consists of *kafta*, a sort of meat ball, and sticky sweetmeats with wafer biscuits. Enormous quantities of tea and soft liquids are required.

The Koranic law relating to ablution has be specially

provided for. Muslims are required to wash before each of the five daily times of prayer, the face, hands and feet being laved, and the arms as far as the elbow. It can be imagined that the ordinary toilet basin in an aircraft has been found quite inadequate for this purpose, and so a deep tray has to be fitted to cover the floor below the basin. To conserve the emergency supply, the tap is usually disconnected and arrangements made for a small measure of water to be drawn individually. It is also customary to remove one sanitary furnishing complete, by the hinges, to prevent it being damaged by misuse.

It cannot be denied that the first, at any rate, of these flights is a romantic experience. A large group of Pakistani Muslims gathers about the passenger-loading point in front of the Karachi airport buildings. It is two hours after midnight as the aircraft taxies into position from the parking site. There is a warm, moist wind from the Arabian Sea, and patches of stratus cloud are drifting across the face of the moon; the air is heavy with the scent of jasmine from the garlands which are hung about the necks of the men. Pilgrims and well-wishers alike are dressed in their finest clothes in honour of the occasion, the men in black frock-coats and white jodhpurs, the women in long veils of black or dark-green silk over lighter garments which are embroidered with gold and silver thread. If there are two parties in one aircraft the country women, usually more orthodox Muslims, may be recognized by the ankle-length *burkah*, an enveloping garment of white linen with a visor-like headpiece. The baggage consists of rolls of bedding, and cooking and drinking vessels.

When the farewells have been completed on the tarmac, the pilgrims are shown to their seats where they are briefed in Urdu by a uniformed Pakistani traffic officer. He tells them of the arrangements for emergencies, for drawing water, and how to use the paper bags. Those from the stricter communities who are inured to *purdah* will find it strange to eat in public, and to be served or tended by a European woman, but they quickly afford their confidence to a sympathetic hostess.

In the dimly lit cabin after take-off these people exercise their enviable gift to compose themselves immediately to sleep, the younger children curling up within their seats like fledglings in the nest, and the women, unused to western conventions of sedentary deportment, wedging their limbs against table tops or window frames; the gangway is littered with cast-off sandals, and the shapely feet projecting from embroidered silk *pyjamas* reveal an unexpected propensity for lacquered toe-nails. The pink dashboard lighting of the cockpit shows the crew stooping over their various tasks; trained as they are to ignore feelings and work in facts when in the air, they are still unable to dissociate themselves entirely from the general sense of expectancy. In the bright moonlight, high above the Arabian Sea, there is a view from the cockpit windows of the silver line of tracery where the swell from the south-west monsoon is breaking in surf along the barren shores of Baluchistan; it is an appropriate setting for the fabled magic carpet. When the first streaks of dawn light up the sky astern, the pilgrims will rise in turn to draw water from the galley, and after their ablutions will carry out the first of the five daily prayer sessions. Their prostrations will be performed in the gangway for in that direction Mecca lies.

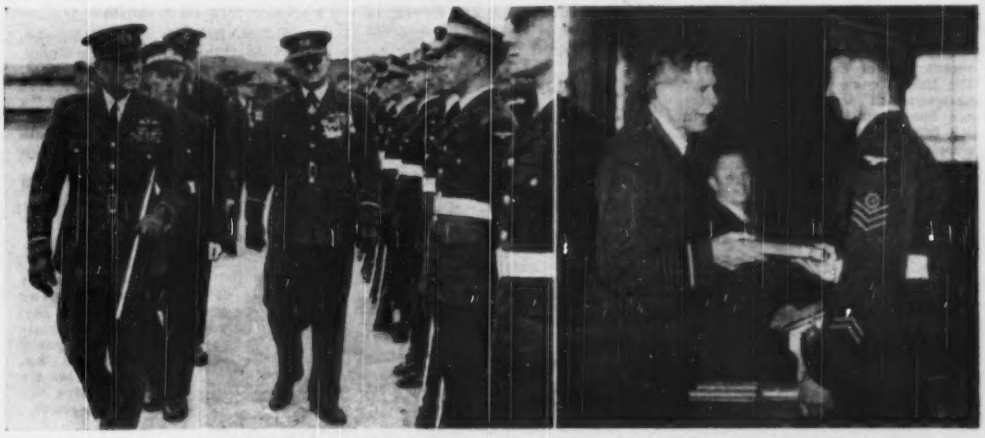
It is convenient to refuel at Bahrein, for aircraft are routed from there across the Nejd. There is an emergency diversion available at Riyadh, but normally that city, too, must be avoided, for it is King Ib'n Saud's capital. European crews which land there for any reason are confined within the guest house, and are not permitted to come and go within the city, although every facility is given them to complete their business.

The pilgrims always ask for warning of one hour from E.T.A. This is so that they have time to don the *ihram*, a two-piece egalitarian garment of white linen which is the stipulated garb for entry into Mecca. Unfortunately this period coincides with a particularly rough part of the flight. It has been related that the schedule is fixed to arrive at Jidda in time to proceed by road to Mecca before sunset; this means the late forenoon. Between the Nejd and the mountains of the Hejaz there is a plain of lava called *Harra*. It has resisted all weathering and lies bare and pitiless under the brassy sun. In the hot weather (the *haji* season has been the late summer these last few years) it is an area of fierce convection currents from early forenoon until sunset; there is hardship enough for the women in the confined space of the cabin and the abeyance of their habituar *purdah*, without the distress of sickness.

In a short while the mountains are cleared, and the long descent to the Red Sea begins. From circuit height at Jidda the channels and shoals which form the anchorage can be seen, with shallow-draught dhows shuttling the human freight from large steamers to the jetties. The road to Mecca runs south-eastwards into the distant hills. Jidda airport consists of a huge landing strip with few facilities to serve it. The marshalling area is filled, during the season, with aircraft from all the Arabic countries of the Middle East and Fertile Crescent, and is subjected to a sandstorm whenever one taxies in or out. British aircraft are usually handled by those shipping and mercantile houses which have held our trade in these parts of the world. At the parking site there are no arrangements for the disposal of refuse; Elsan containers are tipped into the sand amid a welter of garbage and rejected food boxes. In time the blazing sun and hot desert wind can destroy all filth, but at this peak time the accumulation is too rapid.

There are flies everywhere, so thick that one cannot take the cool drink in one's hand. Aircraft are landing all the time, and a zealous agent has only one desire—to turn his clients round as soon as possible. The large cheque for *haji* fees is handed to the Saudi Arabian authorities, and with blessings and handshakes the men bid farewell to the crew. Dominating the scene are the tail fins of the Freighters of Saudi Arabian Airways. They carry the arms of the country, with the Arabic script *La illaha ill 'Allah*, battle cry of the Wahhabi and creed of Islam—"There is no God but God."

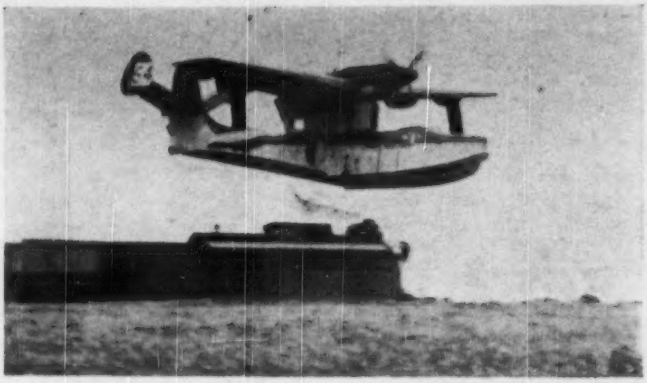
FOUNDER'S DAY



Marshal of the R.A.F. Viscount Trenchard—the "Father of the Royal Air Force"—was the reviewing officer when the passing-out parade of the 57th entry of aircraft apprentices was held at Halton last week. He is seen (left) inspecting the ranks of the Entry and presenting a prize to Sgt. App/Air. A. R. Murray, highest in all subjects. Details of the parade appear on p. 134.

HERE and THERE

FOR THE RECORD: During the Air League Cup Race at Sherburn-in-Elmet, L. R. Colquhoun (who has been awarded the George Medal for a totally different exploit, as recorded on p. 82) flew this Supermarine Seagull at 241.9 m.p.h. on one 100-km lap, setting up a new record for amphibians.



Sign of the Times

REQUISITIONED for 11 years, Portsmouth Airport has now been returned to the Portsmouth Corporation. The terminal building, formerly known as The Chalet, has been redecorated, and is being operated by the Corporation as a buffet, bar and restaurant under the new title *Flying Saucer*.

News of the SR/A1

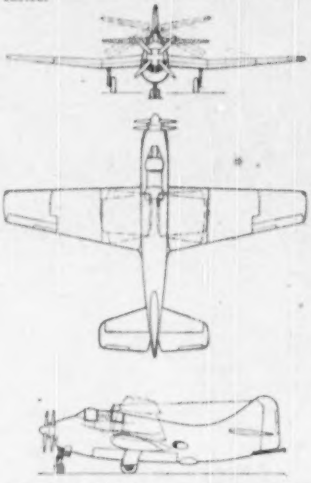
SAUNDERS-ROE, LTD., reports that its prototype SR/A1 jet fighter flying boat recently returned to Cowes from the Marine Aircraft Experimental Establishment at Felixstowe. "Certain modifications" are being incorporated, and it is intended that development flying will be resumed later this summer. Two Metrovick Beryl turbojets give the SR/A1 a maximum speed of at least 500 m.p.h.

British Zero Reader

IT has been announced that new B.O.A.C. aircraft are to have Sperry Zero Readers. The particular equipment selected has been designed and produced in this country and no dollar payment will be involved.

Praise from the States

ADMIRAL D. C. RAMSEY, president of the U.S. Aircraft Industries Association, stated on his return from a recent tour of the British industry: "The British come to school to us for mass-production technique, but they make fine aircraft, and we can learn much from them." The Admiral was accompanied on the tour by presidents of several American aircraft companies. They visited Farnborough, for the R.A.F. Display, and the Handley Page, de Havilland, Bristol and Vickers factories.



SUBMARINE-KILLER: First general-arrangement drawings of the Fairey 17 anti-submarine aircraft. Dimensions are: span, 54ft 4in; length, 43ft.

Fiat G.80 Data

THOUGH primarily intended as a trainer, the Fiat G.80 Goblin-powered two-seater (drawings of which appeared in our previous issue) is reported to have interchangeable nose sections allowing conversion for photo-reconnaissance or fighting. Both pupil and instructor, seated in tandem, are provided with Martin-Baker seats.

With wing-tip tanks, the fuel capacity is about 500 gallons, and maximum weight is 11,000lb.

F-80's in Action

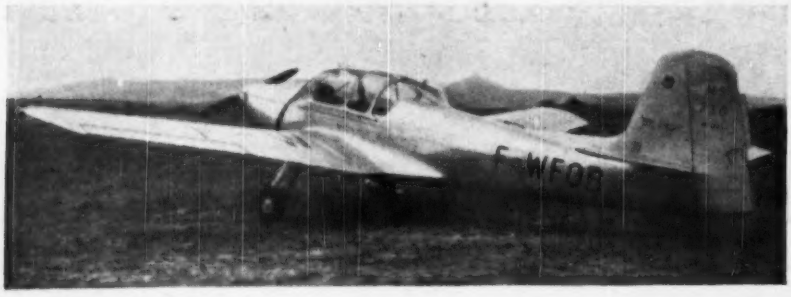
AMERICAN F-80 Shooting Star squadrons of the Fifth Air Force operating in the Korean war have had the opportunity to study operating and servicing problems under operational conditions. According to *Aviation Week*, the alcohol-water injection system should be eliminated; it is not used, as it gives so little extra thrust.

Electrically operated canopies are an unnecessary luxury, say the maintenance crews; the F-80's former hand-cranked cockpit cover was slightly less convenient but gave a better serviceability factor. The earlier F-80A is said to have been easier to maintain than the F-80Cs in service, because of better positioning of the auxiliary gear box. Criticisms are minor, however, and the F-80 has been proved an excellent ground-attack weapon, capable of standing up to severe battle damage. Fewer than 100 aircraft flew 1,674 sorties in ten days.

Thunderjets in Britain

OVER 70 Republic F.84 Thunderjets of the 20th Fighter-Bomber Group, U.S.A.F., arrived at Manston, Kent, during the last week-end of July. The aircraft, which flew the Atlantic *via* "a Northern route," were previously stationed at Shaw Air Force Base, South Carolina. One Thunderjet was lost during the crossing.

Arrival of the Thunderjets represents



FRENCH PRIMER: First prototype of the Morane-Saulnier M.S. 730, a neat new two/three-seat basic trainer. The power unit is a 195 h.p. Mathis engine, but the second prototype will have an Argus 10c unit of 240 h.p.

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HERE AND THERE . . .

an extension of the post-war programme of rotational overseas training for combat units of the U.S.A.F. Formerly, only American bomber groups, equipped with B-29s and B-50s, have trained in Britain. There are now two sizeable forces of American jet fighters in Europe, therefore: the F-84s at Manston and a group of Lockheed F-80 Shooting Stars at Furstenfeldbruck in the U.S. Zone of Germany.

IMPRESSED: Mr. A. E. Woodward-Nutt, Director of Military Aircraft Research and Development, Ministry of Supply, descends from the Blackburn and General Aircraft G.A.L. 60 prototype transport. He expressed pleasure with the steadiness of the aircraft after flying in it as a passenger.

Hawker Siddeley Appointment

MR. PERCY DAVY, O.B.E., has been appointed Hawker Siddeley Group representative in India, and left London last Friday for his temporary headquarters in Bangalore. After a visit to Indonesia, he will return to England for the S.B.A.C. Show. Until recently, Mr. Davy was Deputy Director-General of Civil Aviation in India.

During his long Service career, both as a pilot and engineer officer, he served for some time in India and, in 1940, was responsible for organizing the training of Indian mechanics. Since the war he has held several senior posts in India's Directorate of Civil Aviation.

Refit for U.S.N. Dakotas

CONVERSION of 100 Douglas R4D (Dakota) transports into military versions of the Super DC-3 has been ordered by the United States Navy. The work of modernization, which will be undertaken by the Douglas Aircraft Corporation, entails the installation of more powerful Wright 1820 engines; the fitting of new outer wing panels, undercarriage wells, and a retractable tailwheel; and doubling the fuel capacity.

Larger, square-cut tail surfaces will be incorporated and the fuselage length will be extended by 3ft. All-up weight of the "Super-Daks" will be 31,000 lb—an increase of 6,000 lb—and their maximum speed will be 270 m.p.h.

Designer's New Post

MR. E. J. RICHARDS, M.A., B.Sc., A.F.R.Ae.S., who has been assistant chief designer of Vickers-Armstrongs, Ltd., at Weybridge, since 1945, has been appointed to the newly established Chair of Aeronautical Engineering in University College, Southampton. He will leave his present post at the end of next month. Mr. Richards received the 1949-50 George Taylor Gold Medal of the Royal Aeronautical Society for his *Review of Aerodynamic Cleanliness*, which was selected as the best paper of the year.

A slight reduction in the number of pages in "Flight," and some delay in reporting events, continue to be unavoidable as a result of the withdrawal of overtime working by a section of the printing industry.

AUDIENCE—Her Royal Highness the Duchess of Gloucester (followed by the Duke), welcomed by Air Marshal Sir Richard Peck on arriving at the premiere of *The Wooden Horse*.

NEWS IN BRIEF

REPRESENTATIVES of the engineering faculties of eleven Canadian universities toured the aircraft and engine divisions of the Bristol Aeroplane Company on July 28th. Their visit to this country is under the auspices of the British Council.

* * *

The general manager (commercial) of B.O.A.C., Mr. J. W. S. Brancker, will lecture on civil air transport during a course on transport problems to be held at Ashridge College during the week-end of September 8th-11th. The inclusive fee for the course, which is open to men and women of all ages and occupations, is £3 10s; enquiries should be addressed to the Secretary, at Berkhamsted, Herts.

* * *

It should be made clear that the Venner lightweight alkaline accumulators to which reference was made in *Flight* for July 27th are available in 28 different sizes, ranging from a capacity of 0.5 a.h. to 40 a.h. The cells have a nominal voltage of 1.5 each, and can therefore be assembled in a battery to give any voltage which is a multiple of that figure. The makers are Venner Accumulators, Ltd., Kingston-By-Pass Road, New Malden, Surrey.

* * *

New general manager of Serco, Ltd., of Wigton House, Clerkenwell, E.C.1, is Mr. Brian D. Songhurst. Golfing members of the aircraft industry will know that Mr. Songhurst is also hon. secretary of the Aircraft Golfing Society.

* * *

Mr. George Jendrassik, who began work on gas turbines in 1935 and is recognized as an international authority on both gas turbines and diesel engines, has been appointed to Power Jets (Research and Development), Ltd., as a consulting engineer.

* * *

Satisfaction with the results obtained with a new high-speed aircraft finish, said to be unaffected by abrasion at speeds of up to 600 m.p.h., was expressed by the chairman of Titanine, Ltd., Admiral Sir Lionel G. Preston, at the company's annual general meeting.

—— AND ACTORS: F/L. Oliver Philpott ("Phil" of the book) is seen at the *Wooden Horse* premiere between Leo Genn (left), who plays Peter Howard, and Anthony Steel, who takes the part of his escaping partner, John.

THE VISCOUNT IN SERVICE

Impressions on a Scheduled London-Paris Flight : 28 Now Ordered by B.E.A.

BRITISH EUROPEAN AIRWAYS last week signed a contract for 28 Vickers-Armstrongs Viscounts, the eight in this total representing the aircraft which were to have been ordered by B.O.A.C. for their associated British West Indian Airways services, but the purchase of which was (as reported last week) deferred. The fleet is expected to go into service early in 1953.

On July 29th, as we reported in our last issue, the prototype, G-AHRF, flew a scheduled London-Paris service, and on Thursday last a member of the staff of *Flight* was aboard the aircraft when it made its second, carrying 25 passengers, and crew and supernumaries, to a take-off weight of 42,000 lb, on service No. 327 ex-Northolt. Capt. Wakelin was in command, with Capt. Mitchell as 2nd pilot and Capt. Rymer acting as navigator. Every possible opportunity is being taken to familiarize pilots with the Viscount, for once they have an endorsement for the prototype passing-out on the Type 701, the 40-seater production aircraft for B.E.A., should be little more than a formality.

The trip to Le Bourget took almost exactly one hour, as compared with the scheduled Viking time of 1 hr 20 min for the 240 miles. On the proving flights, various heights have been tried, and it has been found that 15 min cruising at 12,500ft is a satisfactory compromise on this comparatively short haul; it means, in effect, a fairly fast climb from Northolt and a let-down beginning at Dieppe. A cabin-height of 2,000ft is maintained.

There is no need to enlarge here on the Viscount's extraordinary silence and freedom from vibration, which has been previously described in these columns; but it was educative to sound the views of the ordinary passengers who had been told at the Kensington terminal that they were in for a treat (the traffic officer's mention of "jet aircraft" caused, we thought, a certain timidity, something like a Meteor doubtless being visualized—but a tactfully-worded letter distributed on board spoke of "the world's first turbine-engined aircraft to operate a scheduled passenger service," and this and the smoothly spinning airscrews of the four Darts soon gave reassurance).

On the first Paris service : Air Commodore Sir Frank Whittle (left) and Mr. George Edwards (designer of the Viscount).

An experienced airline traveller, the Hon. Mrs. Hillgarth, told us she thought the Viscount trip "by far the quietest and most comfortable" she had ever made, and said she was specially impressed by the roominess of the cabin and width of the aisles; and a U.S. Navy ship's writer, YN2 R. T. Schroyer, observed succinctly, "Brother, it's just swell." Another passenger to whom we spoke admitted it was her very first flight—which seemed to promise some disillusionment if her next should happen to be an elderly piston-engined aircraft.

After further London-Paris runs, G-AHRF will be transferred to a special London-Edinburgh service in connection with the Edinburgh Festival (a proving flight has already been made); from August 15th to 22nd it will make one round trip daily, with a flight-time each way of about 1 hr 40 min. After this, the aircraft will be engaged on an extensive series of crew-training flights.

YPENBURG DISPLAY

Western Union Air Forces Support Dutch Event

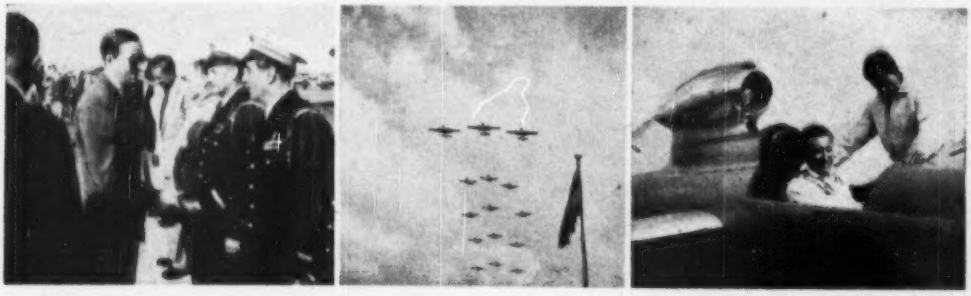
ORGANIZED by the Royal Dutch Aero Club in conjunction with the operators of Ypenburg Airfield, near the Hague, the three-day Ypenburg Display and Aero Show over the week-end of July 28th-30th attracted strong Air Force support from the Western Union countries and was seen by over 50,000 people.

The meeting was opened on the Friday by the Minister of Transport, Mr. Spitzen, and on the Saturday Prince Bernhard of the Netherlands arrived in his private Stinson Sentinel. The flying display thereupon began, with formation aerobatics by Netherlands Air Force Harvards under the command of Maj. de Zwaan, followed by a formation of Mitchells, 15 Fairey Fireflies of the Naval Air Force, and an A/S.R. Sea Otter.

A squadron of Meteor 4s of the Belgian Air Force then made a high-speed surprise arrival and gave a splendid demonstration of high-speed aerobatics. By contrast, the next item was contributed by the graceful little Fouga Sylphe jet-propelled glider, in the skilful hands of Leon Bourrieaux, the Castel-Mauboussin test pilot.

Repeating the show they had given at Antwerp a month earlier, *The Skyblazers*, the famous U.S.A.F. Shooting Star team, gave fascinating proof of their skill at high-speed, close-

(*Concluded on page 182*)



Left to right: Prince Bernhard congratulates some of the pilots; Mitchells fly in formation; and the Fouga Sylphe with its pilot.

SISTER SHIP: The first anniversary of the D.H. Comet's maiden flight was celebrated at Hatfield in truly enterprising style by making it the occasion for the first trip of the second aircraft. Further news is given on this page.

SECOND COMET FLIES

EXACTLY one year to the day after the first Comet took off on its maiden flight, the second aircraft made a successful first flight on the evening of July 27th. Piloted by John Cunningham, it was airborne for 28 minutes, in the course of which it climbed to 18,000ft and, before landing, flew twice across the airfield at a low level, for the benefit of hundreds of factory workers who gathered to watch it.

To date, the first Comet has achieved over 320 hours of test flying, and now that the second aircraft is available the development programme can proceed at an even greater pace.

The de Havilland company attributes the rapid progress of the Comet testing programme in some measure to extremely thorough pre-testing of components on the ground. A great deal of flying is still necessary, however, in order to prove such equipment as the cabin-pressurization and air-conditioning systems at high altitudes.

The second Comet was built to the order of the Ministry of Supply. The manufacturers hope that the third aircraft—the first for B.O.A.C. and the first to have the bogie undercarriage as a standard fitting—will be flying before the end of 1950.

AER LINGUS RESULTS

AT the Fourteenth Annual General Meeting of Aer Lingus, held in Dublin on July 27th, a net loss of £16,996 was announced for the year 1949-50. The deficit for the previous year was £162,850, so that the new figure reflects a considerable improvement in the company's operating results. Some of the more interesting details of the Board's report are that the total of passengers carried amounted to 199,023—an increase of 19 per cent on the previous year—and that the tonnage of cargo lifted was 2,032—an increase of 91 per cent. It also stated that "the all-round increase in the volume of business, coupled with substantial reductions in the operating loss and in the deficit on the profit-and-loss account, are the most welcome features of the year's operations."

The increase in gross revenue is said to have been largely due to the £35,000 increase in cargo revenue. The increased volume of this traffic has justified the inauguration of regular all-freight services to Manchester and London, which are of particular value to Aer Lingus in providing a relatively steady source of income to level out the sharp seasonal fluctuations which always exist in passenger traffic in the United Kingdom. In fact, the report later states that the company's ultimate financial success depends on "its ability further to increase revenue from cargo and mail, particularly in the off-season."

Aer Lingus is also studying the question of DC-3 replacement, but it is understood that no decision is likely to be reached for some time to come. The recent purchase of an additional aircraft brings the total of its DC-3 fleet to 14.

AIRMET

ALTHOUGH ten weeks have passed since the Postmaster-General said, in the House of Commons, that the possibility of using the B.B.C. Third Programme frequency (up to 6 p.m.) for the revival of Airmet broadcasts "was being investigated," nothing concrete has emerged.

Supporting aviation, farming and shipping interests in the widespread plea for the revival of this service, *Wireless World* says in a leading article that use of the 647 kc/s Third Programme channel might well serve as a temporary expedient, in spite of the inadequate coverage of the transmitter, even when assisted, as it is, by low-power relay stations on 1546 kc/s.

If a frequency covered by ordinary broadcast receivers cannot be used, continues the article, a bad second-best is the choice of one to which such receivers can easily be adapted. A frequency in the neighbourhood of 2 Mc/s answers this requirement fairly well, though it would demand a number of linked stations for adequate coverage. The costs of distribution in this manner might be high—but weather broadcasting is more than an amenity; it may be a matter of life and death.

THE CORPORATIONS' YEAR

THE publication of operating and traffic statistics for the first quarter of this year enables a provisional assessment to be made of the traffic results for scheduled services flown by the Corporations in the financial year ended March 31st.

Provisional figures show that during the year the Corporations together carried approximately 900,000 passengers, 10,300 tons of freight and 5,500 tons of mail. The passenger total represents a 26 per cent increase and the freight and mail figures 20 per cent increases on the results for the previous year. Passenger-miles flown totalled 634 million—an increase of 12 per cent; freight ton-mileage rose by 11 per cent to 18 million, and mail ton-mileage by 7 per cent to 11 million. While the capacity ton-mileage figure (152 million) represents an increase of 18 per cent on the previous year, the total of revenue load ton-miles flown (87 million) shows an increase of only 10 per cent. The overall revenue load factor fell from 60.9 to 57 per cent.

The main traffic statistics for both Corporations and for the companies operating under associate agreements with B.E.A. are given in the table below. For comparison the results for

CIVIL AVIATION NEWS . . .

the previous financial year (1948-49) are given in italics, together with percentage change. It is emphasized that the figures are provisional and that final results, including the financial figures, will be issued when the Corporations' annual reports are presented to Parliament.

	B.O.A.C.	B.S.A.	Total for Corporations	Associates
Aircraft-miles ...	26,880,487 *20,893,638* + 13.0	16,[illegible]789 *12,786,907* + 25.5	42,910,171 *33,680,545* + 1.7	1,371,652 *111,736* —
Capacity ton-miles ...	115,584,094 *102,593,736* + 12.7	36,666,007 *26,275,607* + 39.5	152,250,[illegible] *128,869,345* + 18.1	1,393,990 *72,096* —
Passenger-miles ...	420,484,498 *409,640,113* + 2.6	213,562,462 *155,027,743* + 37.8	634,146,960 *564,667,856* + 12.3	6,667,258 *337,216* —
Mail ton-miles ...	9,083,741 *8,954,260* + 1.4	1,692,335 *1,154,224* + 46.6	10,775,076 *10,108,484* + 6.6	557 — —
Freight ton-miles ...	15,219,854 *13,969,553* + 9.0	2,951,095 *2,333,859* + 26.4	18,170,949 *16,303,412* + 11.5	212,581 *16* —

As the table clearly shows, B.E.A. again enjoyed the lion's share of the overall improvement in traffic on British scheduled services. The most noteworthy increases are those in passenger-mileage (37.8 per cent), and mail ton-mileage (46.6 per cent) against an increase in capacity ton-mileage of some 10 million (39.5 per cent).

B.O.A.C. flew 12.7 per cent more capacity ton-miles in the same period; the figures for passenger and freight-ton miles flown rose by 2.6 and 9 per cent respectively.

Meanwhile, the preliminary estimate of B.E.A.'s operating deficit for the financial year ended March 31st, 1950 (see *Flight*, July 27th), has been placed at £1,363,594—less than half of the loss incurred during the previous year. B.O.A.C.'s deficit for the same period has been estimated at approximately £8 million—a figure which is almost the same as the combined deficits of B.O.A.C. and B.S.A. for year 1948-49.

Speaking in Salisbury (Rhodesia), where he will attend the official opening of Livingstone Airport on August 12th, Sir Miles Thomas, chairman of B.O.A.C., said that the reason for this apparent lack of progress was that the substantial economies which had resulted from re-organization and improved operating efficiency had been offset by the unexpected extra costs (amounting to more than £2 million which the Corporation had had to face during the past financial year.

That B.O.A.C.'s trend is definitely towards improvement, however, is shown by the fact that direct operating costs have been reduced by more than £500,000 and—a sure index of increasing efficiency—the output of ton-miles per employee has risen by more than 15 per cent.

TARMAC TUGS

SOME informative observations on requirements for modern airport-tractors are made by the Mecury Truck and Tractor Co., Ltd., of Gloucester, who, with the collaboration of B.E.A. at Northolt, have been making development tests to evolve an "ideal" vehicle.

To tow a big aircraft weighing anything up to 60 tons, they remark, requires a vehicle which is itself heavy; it must, however, be low enough to pass under wings, be very light in clutch and steering action, give unobstructed view in all directions, and be very manœuvrable. As it works outdoors in all climates, night and day, it must be weatherproof and easy to start. It must have a range of speed from "inching" to a serviceable 15-16 m.p.h. It must be able to carry four or five ground crew, and it should have a suspended back axle to prevent road shocks on rough perimeter tracks from being transmitted to the aircraft. For night work, intelligently planned lights are essential—spotlights and "spreads" in exactly the right position, as well as the usual navigation lamps. Above all, since it will have to work exceedingly long hours, the ideal tug must be economical and easily maintained.

"Modern airport practice," it is added, "tends steadily towards towing instead of taxi-ing; it is kinder to aircraft engines, to passengers and to crews, and to people who happen to get in the slipstream. When jets take over entirely from airscrews there will be no more taxi-ing, and the aircraft tractors which have been developed for this one purpose will come into their own."

DESERT WEATHER

ISSUED by the Meteorological Office as No. 5 in its *Reports* series, *Aviation Meteorology of the Route Castel Benito-Cairo* (H.M. Stationery Office, price 1s 6d), describes the movement of depressions and fronts and the associated weather on the various sections of the route. Visibility, cloud, wind, rainfall, and other factors are discussed individually for the different seasons of the year, and a number of climatic tables are given.

Much of the route lies over desert areas and fine weather predominates; the most likely obstacles to comfortable flying are the occasional widespread sandstorms, which occur chiefly in the winter and spring. Settled fine weather is experienced in summer and generally good conditions may also be expected in winter, though then there are periods of showery weather with local thunderstorms. These disturbed conditions are appreciably more frequent over the western part of the route than over the eastern section.

CANADIAN APPOINTMENT

THE promotion of Major Robert Dodds, O.B.E., M.C., Superintendent of Airways and Airports in the Canadian Department of Transport, to the position of Controller of Civil Aviation is announced jointly by the Minister of Transport and the Civil Service Commission. He succeeds Mr. A. D. McLean, who was recently appointed to the Air Transport Board.

Major R. Dodds, O.B.E., M.C.

In his capacity as Controller, Major Dodds will be responsible for the control of all civil aviation within the jurisdiction of the Aeronautics Act, 1919, administration of the air regulations, licensing of personnel and aircraft, maintenance and operation of the Trans-Canada Airways System and the planning and construction of State-controlled airports.

The new Controller has been associated with the Civil Aviation Division since 1930, primarily in connection with the survey and development of the Airways System and Trans-Canada Air Lines. In the first world war, Major Dodds was a fighter-pilot with the R.F.C. and was awarded the Military Cross. During World War II his administrative ability in connection with the provision of airfields under the British Empire Air Training Plan was recognized by the award of the O.B.E.

INTERNATIONAL RESCUE SERVICE

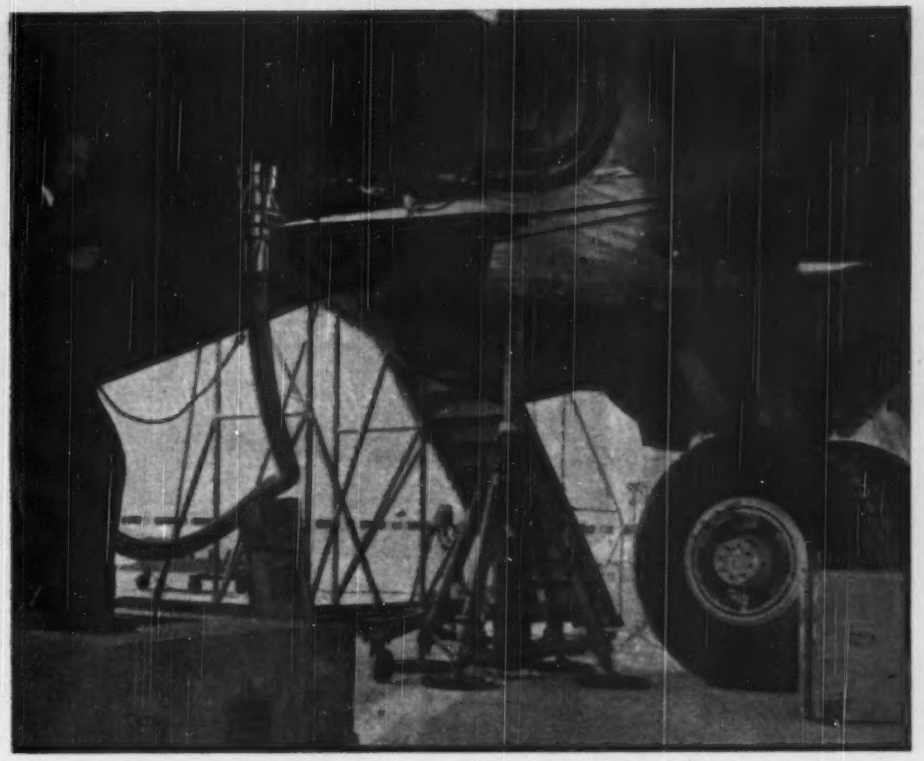
A PLAN for an international search and rescue service has been submitted by I.C.A.O. for adoption by its 58 member states. It is outlined in the new set of standards and recommended practices that will become effective on December 1st as Annex 12 to the I.C.A.O. Convention unless in the meantime a majority of members register disapproval.

Based broadly on wartime techniques, the rescue organization will place an emphasis on economy consistent with reasonable protection for the air-travelling public. To this end, States are called upon to pool their resources and to formulate joint plans.

The Annex envisages that public services such as army, air force, and navy and police detachments, provided they are suitably organized and equipped, will be able to undertake

FORTHCOMING EVENTS

Aug.	16.	R.A.F. Golfing Society: Match v. R.N. and R.M. G.S., West Hill.
Aug.	19	Swansea and District Flying Club: Kemsley Trophy Race (International), Fairwood Common, Swansea.
Aug.	20.	Skegness Air Rally, Ingoldmells.
Aug.	24	Association of British Aero Clubs: Summer Convention.
Aug.	26.	Wiltshire Flying Club: Thruxton Races.
Sept.	2.	International Contest for Free Balloons, Holland.
Sept.	2.	Coventry Aero Club: Siddeley Challenge Trophy Race Baginton, Coventry.
Sept.	5-10.	S.B.A.C. Flying Display and Exhibition.
Sept.	8-11.	Biarritz International Rally.
Sept.	15.	Battle of Britain Day.
Sept.	15.	R.A.F.: "At Home" Day.
Sept.	16.	Daily Express International Air Race, Hurn Airport, Bournemouth.



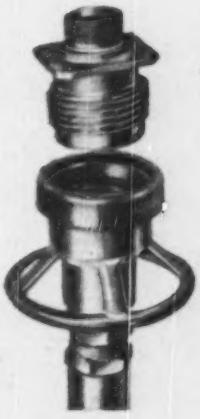
Refuelling: the new technique

Although the fuel is fed into the bottom of the tank, there is no leakage with the Lockheed-Avery self-sealing pressure connections.

A very high rate of flow is obtainable, considerably reducing the time spent in refuelling, and giving a quicker turn-round.

The automatic self-sealing characteristics of both halves of the coupling make connection and disconnection possible *without* spillage.

As used by leading aircraft firms and oil companies. Developed from the well-known Lockheed-Avery couplings, of which more than half-a-million have been used on British aircraft.



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CIVIL AVIATION NEWS . . .

search and rescue operations. Only in exceptional circumstances will it be necessary to form units exclusively for the purpose.

A series of regional air navigation meetings held by I.C.A.O. throughout the world has examined the facilities existing within each region which might with advantage be utilized. As a result, recommendations have been made for using such diverse services as camel corps, alpine teams, and ocean weather vessels. (One such ship—the U.S. Coast Guard cutter *Bibb*, on ocean station duties in mid-Atlantic—rescued in October, 1947, the entire complement of 69 persons from the Boeing 314 flying-boat *Bermuda Sky Queen*.)

Annex 12 recommends methods of organizing rescue services, procedures to be followed when aircraft are missing, and signals to be used by search parties as well as by survivors. It would require contracting States to permit immediate entry of rescue parties into their territories, subject to certain provisions.

The Annex recommends that packages dropped to survivors be marked, according to a colour code, to indicate the contents. The proposed ground-to-air signal code stipulates messages in English, French and Spanish, together with visual symbols that might be made with pieces of fabric, stones, driftwood, or other accessible materials.

JUNE AIRPORT ACTIVITY

AIR transport movements at United Kingdom airfields during June, 1950, totalled nearly 22,000, an increase of 7.6 per cent over the figure for June, 1949. Total aircraft movements, at 54,815, were slightly less than a year ago.

Over 244,000 passengers were handled during the month—19 per cent more than in the corresponding period last year. Terminal passengers totalled nearly 228,000, an increase of 18 per cent. Northolt airport was the busiest, with 75,000 terminal passengers; London Airport, with 48,000, was second; and Ronaldsway airport, Isle of Man, was third busiest with 16,000—a total probably increased by holiday traffic and the T.T. Races.

Jersey Airport, which is not included in the totals shown in the table below, reported 2,505 transport movements and 20,275 terminal passengers.

Airfield	Aircraft Movements			Passengers handled (terminal and transit)	Freight (tons)
	Air Transport	Other Flights	Total		
Aberdeen (Dyce)	371	937	1,308	2,342	16.7
Belfast (Nutts Corner)	938	106	1,044	11,790	65.3
Birmingham (Elmdon)	629	1,433	2,062	4,187	17.0
Blackbushe	219	1,579	1,798	2,819	99.3
Blackpool (Squires Gate)	565	2,600	3,165	2,322	—
Bovingdon	143	1,546	1,689	2,035	182.9
Bristol (Whitchurch)	126	1,644	1,770	404	.2
Cardiff	364	2,888	3,252	815	—
Croydon	557	1,049	1,806	1,454	96.2
Edinburgh (Turnhouse)	243	874	1,117	2,851	1.6
Gatwick	191	708	899	1,365	22.1
Glasgow (Renfrew)	1,304	836	2,140	14,891	25.8
Hurn	38	2,667	2,705	137	—
Isle of Man (Ronaldsway)	1,847	288	2,135	16,202	48.8
Inverness (Dalcross)	272	39	311	1,075	4.2
Kirkwall	427	37	464	2,620	12.3
Leeds (Yeadon)	273	850	1,123	771	.06
Liverpool (Speke)	767	802	1,569	7,702	82.8
London	2,463	1,540	4,003	50,771	910.8
Lympne	369	1,125	1,494	1,729	561.6
Manchester (Ringway)	1,321	1,267	2,588	12,016	150.8
Northolt	4,776	1,056	5,832	75,633	564.0
Nottingham (Tollerton)	35	426	461	174	.5
Prestwick	767	500	1,267	12,713	23.8
Shoreham	52	1,173	1,225	204	—
Southampton (Eastleigh)	584	1,685	2,269	4,714	3.9
Southampton Water	61	67	128	1,622	31.3
Weston-super-Mare	167	436	603	354	—
Wick	434	12	446	995	7.2
Other airfields	1,555	2,787	4,342	7,716	36.4
All reporting May 1950	21,858	32,957	54,815	244,423	2,955.6
Airfields May 1949	20,305	35,884	56,189	205,336	2,408.7

BREVITIES

ON August 1st Canada and France signed a bilateral air agreement under which Air France is to begin operations on the Paris-Montreal route within the next few months. The agreement is on a reciprocal basis, and T.C.A. will accordingly begin flights on this route some time before next summer.

* * *

According to a report in the French Press, a new company, Union Aeromaritime de Transport, has started regular DC-4 flights between Paris and French West and Equatorial Africa.

* * *

The Avro Jetliner is to be used for freight services on T.C.A.'s domestic routes within the next month. Announcing the fact, T.C.A. stated that the plan for demonstrating the aircraft in Britain next month has [as reported in *Flight* last week] now been cancelled.

* * *

Dr. G. P. Baker, a former vice-chairman of the C.A.B., will present the annual I.A.T.A. paper at the Association's sixth annual general meeting, to be held at San Francisco on October 19th. His address will be entitled "Looking Ahead in International Transportation."

* * *

Comparative figures issued by Central African Airways Corporation for their scheduled services (Vikings and Doves) in May, 1950, and the corresponding month of 1949 show that ton-mileage improved to: passenger, 191,226 (28 per cent increase); mail, 14,961 (26 per cent); freight, 35,136 (9 per cent). The overall revenue load-factor was 61 per cent.

* * *

B.E.A. reports record bookings for the August Bank Holiday period. In the sixteen days preceding the holiday weekend no fewer than 30,000 passengers flew from Northolt alone, 30 per cent more than for the corresponding period of last year. Ninety additional flights were scheduled, most of them being on the London-Paris route.

* * *

The carriage of air freight in Australia (the subject of an article on pages 172-173 of this issue) is reported to have shown an increase of 24 per cent in actual tonnage lifted for 1949, as compared with the total for the previous year. T.A.A. has inaugurated regular night services, which are said to have boosted tonnage by 33 per cent within a few weeks. It is also reported that, for the first time since its inception, T.A.A. will show a profit for the year ended June, 1950.

Trans-Canada Air Lines have presented a Canadian maple-wood gavel to Sir William Hildred, Director-General of I.A.T.A., for his use at the Association's meetings.

* * *

P.A.A. are to establish two central kitchens, one in London and one in New York, to supply pre-cooked, frozen food for their services throughout the world.

* * *

A 23-day return fare equivalent to 4½d a mile is now available to K.L.M. passengers flying between Prestwick and Amsterdam. The reduced rate—£18 10s for the 970-mile round trip—will remain in force until the end of September.

* * *

B.O.A.C.'s tropical experiments in painting white the top surfaces of aircraft, to reduce cabin temperatures, have been so successful that the scheme is to be applied to all the Corporation's aircraft.

* * *

The first production model of the S.E. 2010 Armagnac will be ready early this month for flight tests and proving trials with Air France. The French National Assembly recently voted a special credit for the purchase of fifteen aircraft of this type to be used on the company's transatlantic services.

* * *

A privately owned company, to be known as Air Jordan, and based at Amman, will shortly begin services from that point to Cairo, Beirut, Baghdad and Damascus. Six Consuls will be used initially, but a number of Doves and DC-3s have been ordered. Delivery is expected before the end of 1950 and the company will then operate between Jerusalem and Rome.

* * *

New Zealand's Minister of Civil Aviation, Mr. Stanley Goosman, has announced that his Government is to sell the State-owned National Airways Corporation to private interests "as soon as possible." In a statement, Mr. Goosman said he was convinced that the Corporation, which had hitherto been running at a loss, could, under private ownership, be operated with the highest degree of safety and efficiency and return a reasonable profit to shareholders. Such a change would also relieve the taxpayer of serious financial liability.

* * *

A mineralogical survey of the whole of Australia is shortly to be made by aircraft equipped with airborne magnetometers, which are now being purchased in America. The same type

CIVIL AVIATION NEWS . . .

of equipment was used on a large-scale survey which was recently undertaken in Canada in search of oil. By recording the intensity of magnetic impulses, magnetometers are able to detect ore deposits and provide data on the deeper formations of the earth's crust, thus revealing areas which would justify further seismographic search.

* * *

According to the M.C.A., an extensive programme of flight trials and synthetic tests has shown that the efficiency of aircraft handling by Air Traffic Control on the new National Airways depends to a large extent on the co-operation of aircrews in the matter of R/T procedure. The attention of all concerned is drawn to such points as the correct phrasing and sequencing of reports at reporting points, and the necessity for keeping all transmissions to the bare minimum recommended.

* * *

The carriage of more passengers on nearly all Continental routes enabled B.E.A. to show a profit of £9,145 for June. This compares with a deficit of almost £36,000 in the same month last year, and in view of the present high operating costs, it is a creditable achievement.

FROM the CLUBS

TO celebrate the winning of the King's Cup by one of its members, the Rochester Flying Club organized an "At Home" on July 30th, when a large number of members and their friends dropped in for a chat and tea. Twenty-odd visiting aircraft arrived, some later taking part in the spot-landing competition which was flown during the afternoon. Though all competitors were guilty of undershooting, Mr. Alma, of Broxbourne, was adjudged the deserving winner of a bottle of gin. Similar prizes were awarded to the pilot who had travelled the greatest distance and to the winner of a sealed landing time competition.

Aerobatics by the ever-popular "Bishop of Redhill" were another feature of the flying programme. An adverse weather report was responsible for the visitors' early departure, but Rochester hopes they will return in the near future.

* * *

JULY flying times at the Wiltshire Flying Club suffered considerably by reason of the rain, mist and/or high winds which persisted throughout practically every week-end. The total for the month amounted to only 170 hours, bringing the figure for the year to 956 hours. Two first solos were recorded and two students qualified for their Private Pilot's Licences.

Most of the "club" flights which had been arranged for July had to be cancelled because of the weather, but, fortunately, the "At Home" organized for July 8th proved a popular occasion, despite the counter-attraction of the R.A.F. Display at Farnborough on the same day. A silver tankard awarded by the A.B.A.C. for the arrival competition was won by Mr. Bruce, one of three pilots who had flown Austers from Blackpool. The second prize, an inscribed pewter tankard presented by the Wiltshire Club, was won by Mr. Langridge, of the Hampshire Flying Club.

A club flight to the Eaton Bray Display was arranged for August Bank Holiday Monday.

The Wiltshire Club's principal forthcoming attraction is the Thruxton Air Display and Race on Saturday, August 26th. The main programme will begin at 2.20 p.m., but members and their friends are advised to arrive at the airfield as early as possible. Amongst the items will be individual aerobatics by an R.A.F. Harvard and, in contrast, by a Meteor.

Ending its news bulletin on a happy note, the Club announces that, as from August 1st, flying rates will be reduced to £3 an hour, dual or solo, on Austers and Tiger Moths; a special concession is being made for cross-country flying on Tiger Moths, which will now be available at £2 15s an hour.

NATIONAL GLIDING CONTESTS RESULTS

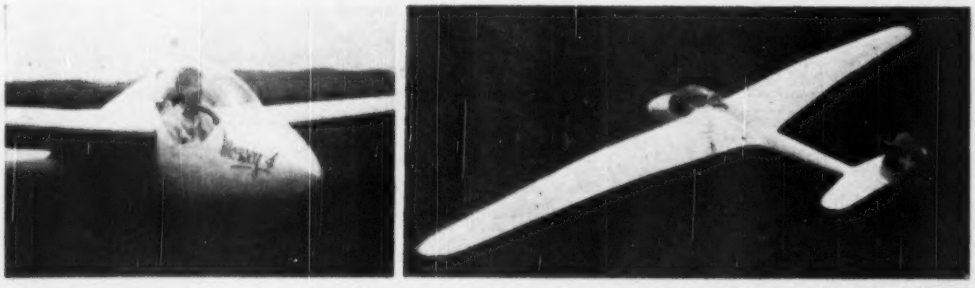
SOME critical comments on the recent National Gliding Contests at Great Hucklow, Derbyshire, were given in *Flight* last week. Below is a list of the principal prizewinners, together with details of the first twelve placings of pilots and the six best performances by individual sailplanes. It should be emphasized that, in the National Contests, the principal prizes are awarded to entrants—in most cases, clubs—and not to individual pilots.

The lengthy prize list includes the award of the Londonderry Cup (for the club nominating the pilot earning the greatest number of points for his team) to the London Gliding Club, the pilot being G. H. Stephenson; the Du Garde Peach Trophy (for the club team gaining the most points) to the Royal Naval Gliding and Soaring Association; the Firth-Vickers Trophy (best performance by a British pilot in a British sailplane) to S. C. O'Grady; and the Eon Cup (for the entrant of the predominatingly British-built type in the Contests gaining the most points) to the London Gliding Club. These trophies also carried £10 cash prizes.

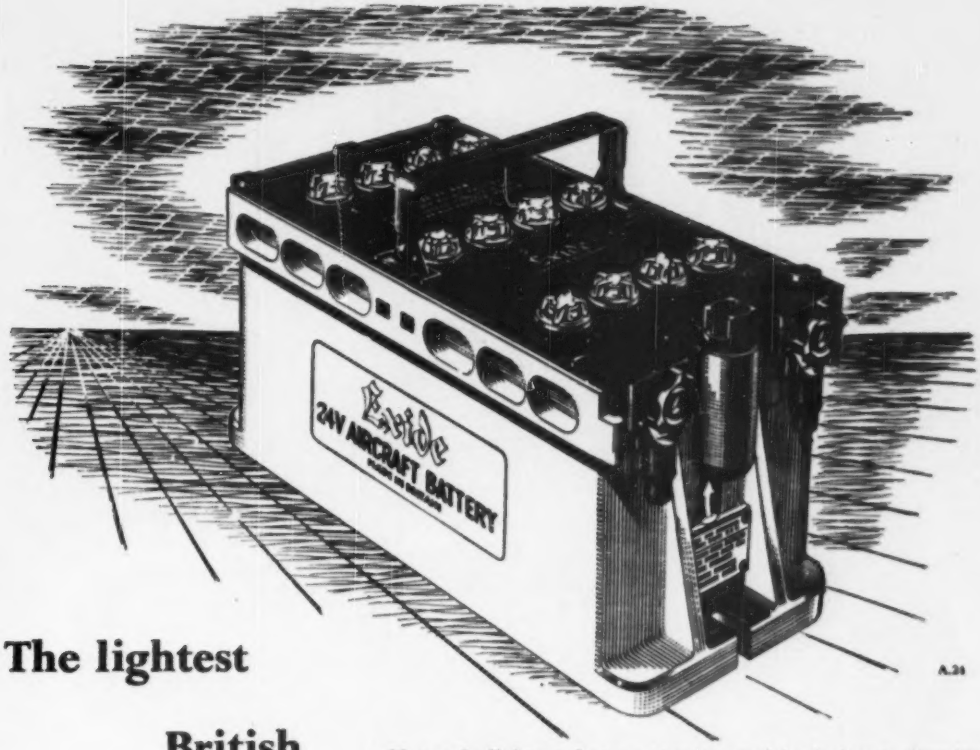
Cash prizes to the entrants of the gliders which earned the greatest number of points went to P. A. Wills (£20), the R.N. Gliding and Soaring Association (£15), and the London Gliding Club (£10). Prizes of £5 for the longest distance, greatest height and the best out-and-return flight were awarded to the Surrey Gliding Club, F. Foster and P. A. Wills respectively.

Final Placing of Pilots.—(1) P. A. Wills (Weihe), 869 points; (2) G. H. Stephenson (Eon Olympia), 805; (3) F. Foster (Rhön-Bussard), 799; (4) D. H. G. Ince (Eon Olympia), 722; (5) Lt.-Cdr. G. A. J. Goodhart (Mu 13a), 632; (6) D. Brown (Weihe), 512; (7) C. Staffurth (Eon Olympia), 463; (8) A. Deane Drummond (Eon Olympia), 317; (9) W. T. Fisher (Eon Olympia), 300; (10) P. Blanchard (Eon Olympia), 273; (11) F/L. Archbold (Eon Olympia), 272; (12) C. A. P. Ellis (Gull IV), 262.

Final Placing of Gliders.—(1) Weihe, No. 2, 867 points; (2) Mu 13a, No. 27, 827; (3) Olympia, No. 21, 805; (4) Rhön-Bussard, No. 4, 799; (5) Olympia, No. 30, 722; (6) Olympia, No. 10, 694.



SWISS NEWCOMER: Exceptional aerodynamic cleanness is the keynote of the Moswey 4 high-performance sailplane which, after making its first flight at the end of June, took part in the International Gliding Contests in Sweden some three weeks later. The design is based on experience gained with the two-seat Moswey 6; the sailplane is said to have pleasant handling characteristics and to be absolutely spin-proof.



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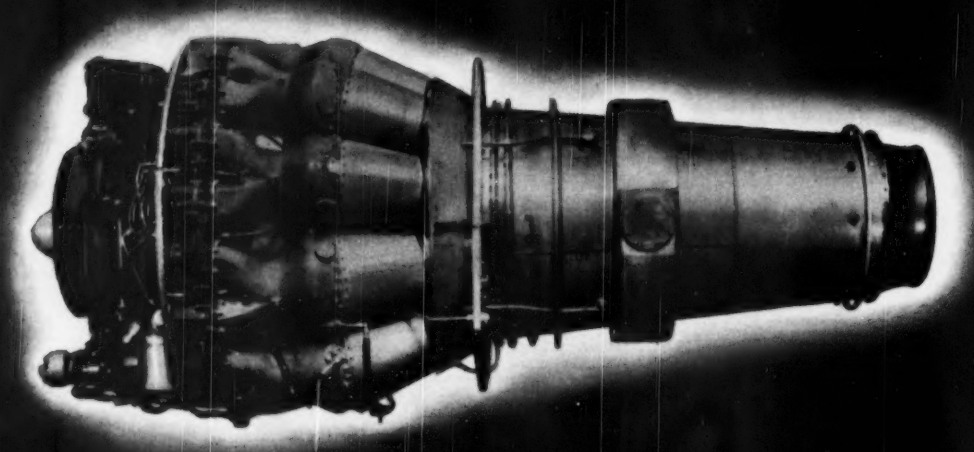

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RESEARCH INTO RUBBER

Aircraft-component Investigations at the New Technical and Scientific Headquarters of the Dunlop World Organization

AS briefly reported in our issue of June 15th, the new scientific establishment known by the title of the Dunlop Research Centre was formally opened on June 7th by Sir Lawrence Bragg, Cavendish Professor of Experimental Physics, Cambridge University.

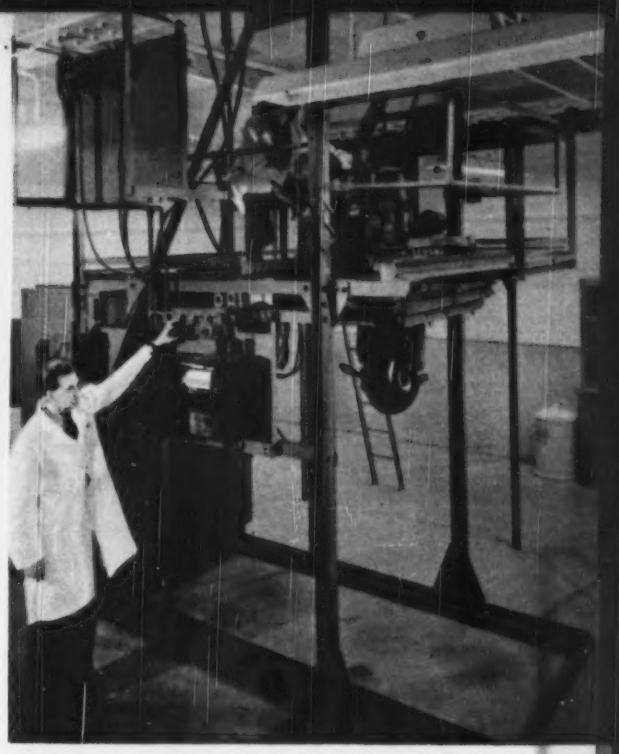
Plans for a central scientific organization were considered by Dunlops before the war, but had necessarily to be deferred; later, in the light of the company's wartime research and development experience, it became obvious that the original proposals required modification and extension. In general, the new Research Centre can be regarded as the fruit of this experience and planning. The original intention was to erect an entirely new group of buildings, but conditions at the end of the war made this impracticable, and it was fortunate that part of the shadow factory at Castle Bromwich became available. The administration building, power-house and an area of land were taken over; the administration building has been almost completely reconstructed to house the main laboratories; the power-house building has been adapted, with considerable extension, to form a pilot plant building; and a new engineering services building has been erected. The total area of the Research Centre site amounts to nearly eight acres, of which about two acres are built on, so that there is considerable room for expansion.

The extraordinary properties of rubber and rubber-like materials are associated with many branches of science, of which the most important are, perhaps, chemistry, physics, engineering and mathematics. As a consequence, the Dunlop Research Centre comprises a great variety of laboratories and a large number of scientific specialists, which make it probably unique in these respects among British commercial research organizations.

On the occasion of the official opening ceremony we were able to make an exhaustive tour of the Research Centre, and most instructive it proved to be, particularly as regards those items which have a direct application to aeronautical practice.

Some of the latest work done in the field of adhesives and bonding technique has been concerned with the successful bonding of rubber, both to aluminium alloys and magnesium. Perspex is another material to which rubber has been bonded, and, furthermore, we were able to see a specimen section of laminated multi-ply sandwich, the alternate layers of which were rubber and wood. Rubber-metal bonding is also used in the couplings which Dunlop have developed for transmitting high mechanical power whilst both insulating the driving motor from shock and operating under considerable angular misalignment.

The use of electrically conductive tyres on aircraft is not new, but the method whereby the property of conduction is achieved may not be widely known. In brief, rubber can be rendered conductive (as can Bakelite and other resins and polymers) by the incorporation of forms of carbon-black which, owing to their crystal structure, tend to aggregate into chain-like groups. The degree of conductivity is considerable, being about a thousand times greater than that of tap-water. The actual properties are dependent both on the type of carbon-black and the type of polymer used, but do not significantly alter the normal wear resistance, extensibility, and other characteristics of the material.



Mounted on floor rails, the cold chamber can be moved into position beneath the pneumatically actuated tyre-impacting unit.

In the larger sizes of aircraft the use of bogie undercarriages is now becoming fashionable, but such units do involve limitations in tractability. This was clearly illustrated by an exhibit in one of the laboratories at the Research Centre. If the several wheels of each undercarriage leg freely rotate around a common axle, no problems arise; if, on the other hand, a tandem arrangement is adopted, it is equivalent to a bicycle or motor car without steering gear, i.e., the undercarriage exhibits a strong tendency to go straight ahead. In order to make a rolling tyre drift off its straight path, a force (known as the cornering force) must be applied at right angles to the plane of the wheel. In addition, a couple or torque is required to maintain the original plane of rotation. Because of the disposition of the wheels in a tandem bogie undercarriage (and, too, because of the cornering properties of the tyres) there exists a related critical radius of turn, below which it is impossible to turn the aircraft without swivelling about the centre of one undercarriage and thus imposing a very high loading on the main leg.

A double-walled soundproof acoustics laboratory is provided for study of the allied qualities of noise and vibration. An electronic sound-level meter and sound analyser are used to assess the loudness and composition of the noise, whilst a vibration-meter and its analyser measure the acceleration, velocity, displacement and frequency components of the main vibrating parts. Waveforms, both of noise and vibration, can be examined on cathode-ray oscilloscopes, and can be compared for linking associated features, so that the origin of the disturbance may be traced. Vibrating parts on rotating members can be examined by a stroboscope, and instantaneous photographs of the relative positions of moving parts can be taken with the aid of a microflash unit coupled to the stroboscope.

One of the devices evolved by Dunlop for the reduction of vibration in aircraft equipment is the Equiflexible mounting, the chief feature of which is that it will function at any angle. The mounting consists of three rubber elliptical springs, which, on the demonstration unit shown, were pyramidally arranged to support a metal weight of 1 lb; although the base of the mounting was severely

RESEARCH INTO RUBBER . . .

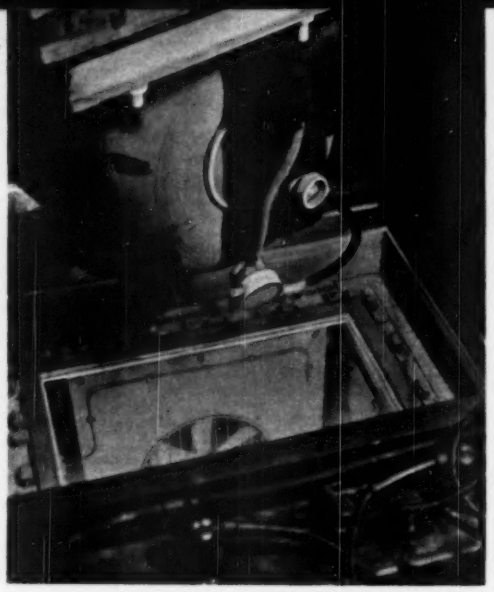
vibrated on a movable test-plate, whatever the position of the plate the supported weight remained unaffected.

Rubber undergoes a marked change in mechanical properties over the temperature range between 20 deg C and −65 deg C. From the universally known resilient material with small permanent set at room temperatures, it passes through a stage of increased permanent set as the temperature is lowered, until it reaches a final stage where it is very hard and tough—like wood or Bakelite—and of very low flexibility. In this state, when sufficient force is applied, the material will fracture in a brittle manner. Understandably, this property is of considerable importance in the design of rubber components for aircraft which operate at high altitudes or in polar regions. An apparatus used at the Research Centre for testing tyres under low-temperature conditions consists of two parts, (i) an industrial-type refrigerator with an 8 cu ft capacity cold chamber, capable of attaining any temperature down to −65 deg C, and (ii) a self-contained tyre-impacting device, which can be lowered on to the refrigerator, so that the tyre is inside the cold chamber. The impacting unit is pneumatically operated, with automatic pre-set load-limiting devices, so that it can simulate the force and timing of the initial landing impact of an aircraft. Tyre load and deflection are recorded on a chart, and can be arranged to illustrate the complete cycle as a hysteresis diagram.

The recent development in silicone rubbers has had a very considerable effect on the applicability of rubbers and rubber-like polymers at extremes of temperature. The heat-resisting properties of the silicones were those first to attract attention, and these properties are remarkable. For example, as part of the normal preparation of silicone articles, they are heated from 4 to 24 hours at 250 deg C, a temperature at which all organic rubbers would either harden up to a bone-like state or decompose to a sticky mass.

After a preliminary run of some months on a pilot plant, Dunlop have now set up a new unit at their works in Cambridge Street, Manchester, for turning out products in silicone rubber. Although the silicone rubbers are produced in various grades of hardness and mechanical properties, all possess the outstanding characteristic of retaining rubber-like properties under conditions of extreme heat and cold. They will, in fact, give an economical life from −55 deg C to 210 deg C. Sealing rings, vibration dampers, and hot-air ducts are but three examples of aeronautical items which will be produced in these materials.

To complement the English centre, and to work in co-operation with it, Dunlop Malayan Estates have recently opened a rubber research centre near Batang Malaka, Negri Sembilan, the primary purpose being to adjust the supply of latex to the varied demands of industry.



Here shown on removal from its cold soaking, the tyre is seen to be covered with frost, and the rubber is hard and brittle.

A LIGHT-AIRCRAFT ODYSSEY

THE news of Rhodesian developments on pages 175-177 lends topical interest to a noteworthy light-aircraft flight from Africa to England, recently accomplished by Mr. and Mrs. C. H. Perrem (of Umtali, Southern Rhodesia), both of whom are in their fifties. In 96 hours of flying, spread over 15 days, their Auster Autocrat (Cirrus Minor II) covered 8,500 miles from Umtali to its makers' airfield at Rearsby.

Some months of preparation preceded the journey, which followed the rarely used route *via* the Belgian Congo, Cameroons, Gold Coast, Rio de Oro and Gibraltar. The Perrems started from Umtali at first light on June 17th, and touched-down at Rearsby on July 2nd.

After thirteen years of active flying in Africa, including a journey from Umtali to Heston and back in 1938 in a Heinkel H.E.64D, with a Gipsy III engine, the couple were under no illusions that the new trip *via* the West Coast would be easy. The stage from Umtali to Elizabethville was flown over some heavy bush, particularly north of the Zambesi to Ndolo. Elizabethville-Kamina-Luluaborg proved to be an easy stretch along the railway, but Luluaborg to Leopoldville lies over dense forest and featureless country, and was covered in thick haze that limited visibility to about five miles.

From Leopoldville to Point Noire, as the railway could not be followed through the mountains and forest, a westerly course was set to follow the lines of the mountains until the Atlantic Ocean was sighted, and a turn was made to port to follow the beach to Point Noire. From there to Libreville Mr. Perrem found to be the most interesting part of the journey, the route lying over very heavy forest, frequently broken by grass clearings occupied by large numbers of wild animals. "We flew this section at 400 feet in what we think was safety," Mr. Perrem told us, "and got a good sight of the wild life."

From Libreville to Duala brought the Auster into the bad-weather area under the influence of the 13,000-foot Mount Cameroon, and during the last 100 miles to Duala the weather deteriorated to such an extent that it was forced to skim the tops of the trees; eventually a chance flash of a tin roof gave a line for Duala.

"From Duala southwards around Mount Cameroon was a nightmare," said Mr. Perrem, "and we had to fly far out to sea around the bad-weather area on the west side of the mountain. Coming clear of the fog and rain, we found ourselves out of sight of land, but, managing to make a landfall near the mouth of the Niger, we landed at Port Marcourt. Great care is required on this section as bad weather and difficult locations of towns increase the difficulties. Port Marcourt to Abijan was a delightful run along the line of the beach. Abijan to Freetown is over heavy jungle, and we met much cu-nim cloud. We went above it, but maintained V.F.R. conditions.

"The Freetown to Dakar section involves navigation over extensive watering systems. Dakar to Vila Asneros, and on to Agadir, is as bad as driving a car the wrong way up a one-way street, the airflow being from north to south 25 knots to 40 knots over several months of the year. On this section our windscreen became affected by some deposit which gave the effect of frosted glass, and try as we could, we could not remove it.

"The last stretch to Agadir was flown under a 100-foot ceiling over the sea adjoining the cliffs of up to about 150ft. This was most unpleasant, and my wife had to lean out as far as possible and direct me to fly close enough to the cliffs to maintain visual contact. This bad weather was with us on arrival at Agadir, and our difficulty was to transfer ourselves from the low ceiling over the sea to the low land where the airfield was situated. We found a river running inland and followed it, to make a landing in better flying conditions. Agadir to London was enjoyable and average."

Great praise was due to the Auster and its Cirrus engine, said Mr. Perrem, for a faultless performance during the entire flight.

MIXED CARGOES

At Essendon Airport (Melbourne) an A.N.A. Freighter is about to load five tons of ice cream for shipment to Hobart, Tasmania.

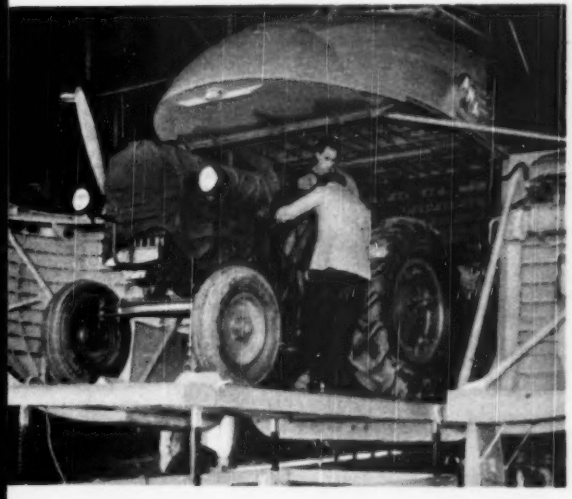
Wool, Machinery and Easter Eggs : the Ubiquitous Bristol Freighter in Australia

SINCE the day in 1945 when the first Bristol Freighter emerged from its assembly hangar to intrigue an interested aviation world with its essentially practical if somewhat staid appearance a host of varied and unusual cargoes have passed through the gaping jaws of these "flying box cars."

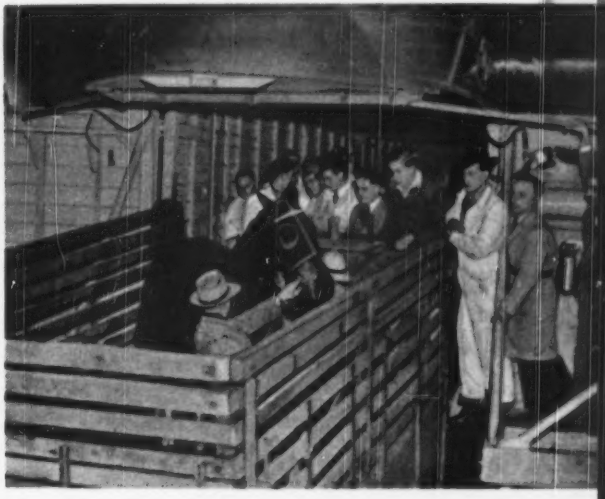
In many parts of the globe the Freighter has been seen going about its lawful duties in the carriage of passengers, machinery, livestock, automobiles and hundreds of other commodities; but perhaps nowhere has its capacious interior been exploited as fully as in Australia. In a country where air transport is considered a necessity rather than a facility the great improvements which the Freighter has made possible in the speeding-up of cargo operations represent an important step in the development of Australian commerce.

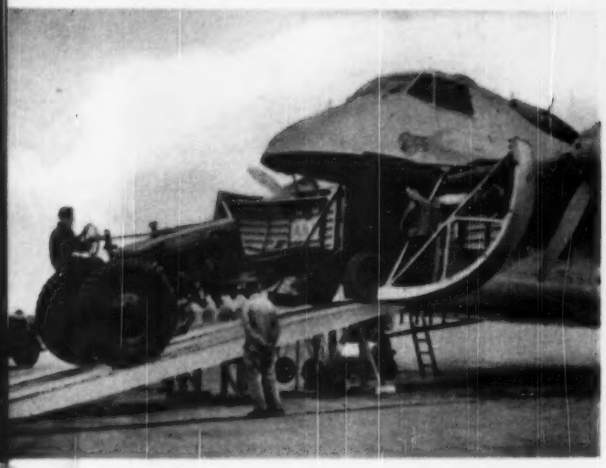
By virtue of its excellent capacity/payload ratio, this aircraft has enabled very favourable freight rates to be quoted, particularly for the bulkier types of cargo. A good example of this is found in the story of Australian National

A.N.A. have developed an adjustable loading ramp for handling heavy vehicles such as the Fordson Major tractor seen here.



Racehorses also find the Bristol Freighter a convenient and comfortable method of getting to the starting gate in a hurry.





This road grader was at work at Flinders Island within 24 hours of being loaded into a Freighter at Melbourne, 200 miles away.

A bulk shipment of wool is seen in the A.N.A. freight hangar at Essendon airport, in the process of being trans-shipped.

Airway's success with the shipment of wool which, in aircraft of normal volumetric cargo capacity, would be considered an uneconomical proposition.

About twelve months ago it became apparent to A.N.A. that, in view of the continually rising sea freight rates between Tasmania and Melbourne, wool would soon be an economically transportable commodity in Bristol Freighters. The company carried out a number of trial shipments from Launceston and Hobart in Tasmania to Melbourne for a contract price of 36s per bale as compared with the surface rate, including wharfage and stacking, of 35s. The average weight of the bales was about 300 lb but dimensions varied according to whether they were (in wool-gathering jargon) "dumped, undumped, or double-dumped."

Based on last year's experience, A.N.A. decided that this year they would exploit the Tasmanian wool trade on a larger scale. In April the company carried some 3,500 bales from Tasmania to Melbourne and have subsequently lifted a further 1,500 bales. As the result of further increases in the surface rates between Tasmania and Melbourne, A.N.A. are now being paid at the rate of 43s 6d per bale from airfield to airfield. The shippers are responsible for delivering the wool to the aircraft and picking it up again at the airport of destination.

Apart from the fact that A.N.A. can now match the surface-transport rate for the carriage of a basic commodity, buyers of fine wool in Tasmania have been attracted by the speed with which it is possible to despatch the bales to Melbourne for processing or onward shipment to the great wool ports of the world, such as Hull, Liverpool and Amsterdam.

Another field in which the Freighter is being used with success is in connection with the "air beef plan." Chilled beef, quartered ready for export, is being flown from the abattoirs at Glenroy to the meatworks at Wyndham, some 195 miles distant. A.N.A. has allocated one aircraft to this work; it is now carrying 12,000 lb of carcase meat on each trip and is making a minimum of three trips a day. The value of this airlift is obvious when it is considered that if the cattle were driven overland to Wyndham their condition would have deteriorated to the extent of yielding 100 lb less beef per beast. Inland killing also makes possible large economies, by eliminating droving expenses and losses on the long trek to the meat factories. The plan is still in its experimental stages, but should it prove successful another plant will be established at Hall's Creek, south-east of Glenroy.

The A.N.A. Freighters are kept busy, on an almost year-round basis, with the carriage of many other commodities. Between March and September they fly vast quantities of beans and peas from Queensland to Sydney and Melbourne, and when these vegetables are out of season tomatoes take their place. In one recent week 150,000 lb of such vegetables were moved from Brisbane to Sydney and Melbourne. Fifteen tons of Easter eggs flown from Melbourne to Brisbane was another unusual cargo carried by Australian National Airways.

At the beginning of the year the shipment of a road grader weighing 9,264 lb, from Melbourne to Flinders Island, enabled the equipment to be in use at its destination just twenty-four hours after loading in Melbourne. The journey by sea would have meant a delay of about a fortnight.

Air freighting of valuable stud rams is a common occurrence on the A.N.A. network. These are being unloaded for a show at Melbourne.

LIVINGSTONE'S NEW AIRPORT

Opening Ceremony by Lord Pakenham: Layout and Facilities

NEXT Saturday, August 12th, will be a great day for the town of Livingstone, Northern Rhodesia, for it will mark the opening of the fine new airport which has been built to handle trunk air services from many parts of the world. The importance attached to this enterprise by the local community may be gauged when it is learned that the cost of the airport, approximately £1 million, represents almost one-tenth of the present annual income of Northern Rhodesia and—still more astonishing—that in 1946, when approval was given for construction, the cost represented one-third of the country's income.

An official history of the development of aviation in Central Africa has been prepared, a summary of which may appropriately be interposed here. The story starts in March, 1920, when the first aircraft landed in Rhodesia. On the final stages of a flight from England to South Africa Colonel van Ryneveld and Major Brand put down a converted Vickers Vimy, *Silver Queen*, at Livingstone and three days later, on March 5th, at Bulawayo. It seems that air-minded businessmen reacted quickly to this flight, for a month later a company called Air Road Motors, Ltd., was registered in Bulawayo. There were no further significant developments, however, until 1927, when the Rhodesian Aviation Syndicate was formed around a single-engined D.H.60.

In 1931 the syndicate acquired Rhodesian Aviation, Ltd., which operated charter flights with a fleet of six D.H. Moths. In the meantime, Christowitz Air Services had started to operate between Blantyre and Salisbury, using a Puss Moth and a Gipsy Moth. Imperial Airways inaugurated the London-Cape service in 1932, making regular stops at Mpika and Broken Hill, in Northern Rhodesia. It is said that this service did much to stimulate aviation in Central African territories. In the same year the Northern Rhodesian Aviation Company was formed and an air-mail service started between Broken Hill and Elizabethville.

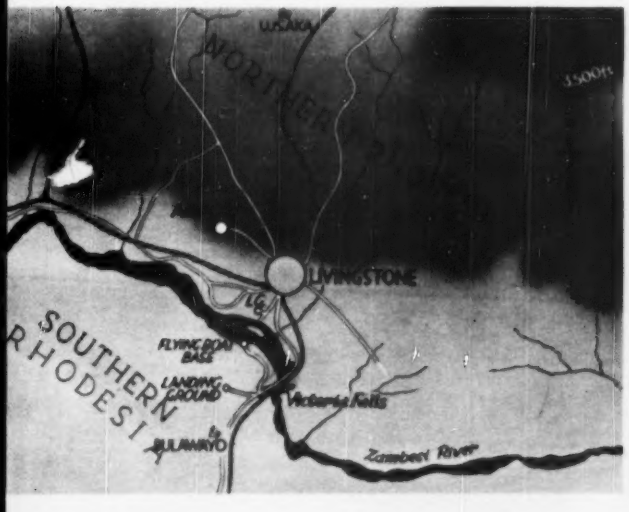
Central Africa's first regular internal service commenced in 1933, when a new company, Rhodesia and Nyasaland Airways, took over the assets of the earlier Rhodesian Aviation and Christowitz companies. Westland Wessex aircraft were used to start with, but Rapides were later introduced. In 1937 the regular internal services were extended to Portuguese East Africa to provide a weekly link-up with Imperial Airways' flying-boat services.

With the inauguration of the Empire air-mail scheme in July, 1937, local aviation companies contracted with Imperial Airways to provide the links between South Africa and Kisumu, the London-Cape route service having been withdrawn. R.A.N.A. had meanwhile extended its field of operation northwards to Lusaka, the new capital of Northern Rhodesia. Wilson Airways, of Nairobi, provided the final link between Lusaka and Kisumu.

South African Airways extended northwards in July, 1937, using Ju52s between the Union and Bulawayo, Livingstone, Lusaka, Broken Hill and Mpika. In 1938 two more companies, Spencers Victoria Falls Airways and British Aviation Transport Services (Northern Rhodesia), commenced operations.

When war broke out in 1939 R.A.N.A. was taken over by the Southern Rhodesian Government and operated as a communications squadron in conjunction with the Empire Air Training Scheme, but the flying activities of all other civil aviation concerns ceased. After the war the Government-owned Southern Rhodesia Air Services started flying Rapides and Ansons. Recently

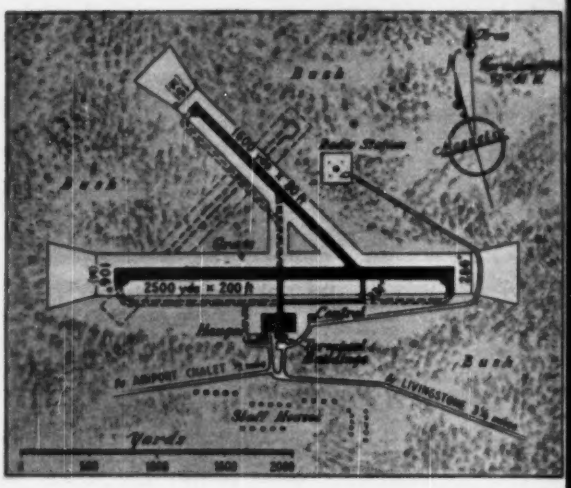
Victoria Falls on the Zambesi River, Livingstone's great natural attraction, holds the attention of a C.A.A. stewardess.



The Livingstone area, showing the town, the new airport, the flying-boat base and subsidiary landing grounds.

Control tower with administrative offices nearing completion.

Buildings take shape in the terminal area. Part of the apron and the main hangar are visible on the right-hand side of the photo.



Airport plan indicating main, subsidiary and possible third runways with their magnetic bearings, dimensions and grass over-runs.

LIVINGSTONE'S NEW AIRPORT

these have been replaced by Vikings and Doves.

In June, 1946, the Central African Air Authority and Central African Airways Corporation were established through legislation passed in the three Central African territories of Southern Rhodesia, Northern Rhodesia and Nyasaland. The former body, consisting of members appointed by the three Governments, was to control the Corporation and was also to be the air licensing authority.

Based at Salisbury, Central African Airways serves not only the Rhodesias and Nyasaland, but provides regional connecting services with the Union of South Africa, Kenya, Tanganyika and Portuguese East Africa. The present route mileage, exceeding 6,500, will be substantially increased when additional supplementary services now planned are introduced. Freight carriage figures largely in the activities of the Corporation, and in the first three months of 1950 120,550 kg of cargo were carried. Since 1947 the total weight of mail carried (first-class letter mail is flown without surcharge) has more than doubled itself.

An important link is provided with Portuguese East Africa by C.A.A. in association with D.E.T.A. (Divisao de Exploraso dos Transportes Aereos), the connecting point being Salisbury.

There are now six surviving private companies, using a total of 32 aircraft and mostly engaged in charter work. Two run scheduled services in the lake area of Nyasaland and between Bulawayo and the Bechuanaland Protectorate.

The eight branches of the Northern Rhodesia Flying Club have been active since 1946 after wartime suspension, and the club receives Government aid in the form of a flying training subsidy.

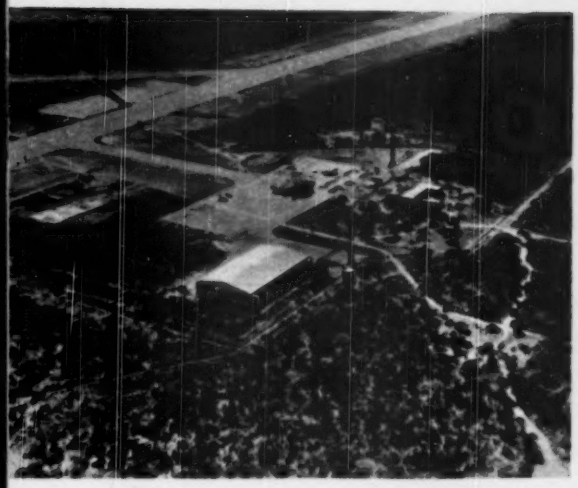
Two physical facts seem to justify the belief in Livingstone's future as an important air centre: it is within a few miles of Victoria Falls, one of nature's grandest spectacles, and is ideally situated between existing stops on the landplane trunk routes from South Africa, Europe, the Middle East and West Africa. Flying boats put down on the Zambesi River nearby. The site on a level, slightly raised plateau is excellent and weather is seldom better anywhere in the world. There are no obstructions or areas of ground higher than the runways within ten miles.

Clearance of the tree- and bush-covered ground for the main and subsidiary runways presented some difficulties, and the risk of erosion of the opened area of sandy soil had to be countered. The annual average rainfall is 26.3 inches, the majority of which falls in December, January and February during seasonal scattered showers and storms. Average sunshine per day is 8.4 hours, while average temperatures vary between 61.1 deg F in June and July and 80.3 deg F in October. Extremes may be 105 deg F in November and a few degrees of frost in June.

A prevailing easterly wind of 5-15 m.p.h. blows with 91 per cent regularity throughout the year, and such cross-winds as are experienced are light. Thus, the main runway would suffice alone. A secondary one has, however, been laid and a third has been considered and sited for possible use in the future. Dimensions and QDMs are given in the plan. Bearing strength of the main runway, taxi tracks and apron (750ft × 300ft) is sufficient for any aircraft likely to land there for some time to come, namely, 150,000 lb distributed between two main wheels. Fourteen to seventeen inches of concrete are surfaced with bitumen. The subsidiary runway, which has an all-weather, sealed surface, is suitable for aircraft up to 45,000 lb a.u.w. on two main wheels.

The controlling and operating authority for Livingstone Airport is the Department of Civil Aviation, Lusaka. Livingstone is classified as an I.C.A.O. Class C.2 airfield at a density altitude of 7,000ft. Average density altitude

This York, first to land on the main runway, brings spares for Hermes IVs soon to operate through Livingstone.



Control buildings with tower, the apron, terminal buildings and large hangar are all placed in perspective in this air view.

figures are max., 6,090ft; min., 3,380ft; mean, 4,735ft. Altitude is 3,040ft (926m) and the position is: lat. 17 deg 49 min 22 sec S; long. 25 deg 49 min 07 sec E. The town of Livingstone is 3½ miles south-east. In daytime the Zambesi River and Victoria Falls provide a fine landmark.

On the east side of the hard standing are the control tower and operations block for the new airport. Here are found the usual flying control, meteorological and radio sections, in addition to the airport administration offices. A fire-fighting centre is also located at this point, and the chief unit of its fleet is a British-made fire-crash tender built to the latest specifications. A few hundred yards away, to the south of the hard standing, is the passenger-handling terminal. For the convenience of in-transit passengers there are 24-hr customs, health and immigration services and a 24-hr restaurant in this terminal building. The lounge and restaurant are divided by a distinctive African mural screen.

For those staying overnight or for longer periods an airport chalet is provided about a mile away to the west; it has 48 beds, dining room, lounge and bar. A new luxury hotel is also being built with the aid of the Colonial Development Corporation. This is sited a few miles distant, overlooking the Zambesi River Gorge, and is to have accommodation for 150. There are four other good hotels in the area and just across the border, in Southern Rhodesia, is the Victoria Falls Hotel.

Of the trunk routes which are expected to use Livingstone, B.O.A.C.'s Springbok service, run in co-operation with South African Airways, will be most important. It is to be operated with newly introduced Hermes IVs, one of which will be present for the opening ceremony. S.A.A. at present operate Skymasters on the service, but are to

Many will regret the withdrawal, for economic reasons, of the flying-boat services. A B.O.A.C. Solent at rest on the Zambesi.

B.O.A.C.'s attractive picture-map provides the background to the corporation's main services to Africa. New routes to South Africa for the forty-seater Handley Page Hermes IV have been accentuated.

introduce Constellations at the end of this month. Pan American Airways, Sabena, and K.L.M. each operate trunk services in the area or actually through Livingstone.

Another Handley Page transport, making an inaugural visit, will also be present at Livingstone on August 12th, for a 42-seater Hastings of Transport Command, R.A.F., left Lyneham on August 4th to commence a bi-monthly trooping service introduced to save aircrew trainees the long sea voyage to and from Southern Rhodesia.

Internal air communications are likely to be expanded considerably during the next few years, for distances are very great between the rapidly expanding communities of Central Africa and surface transportation is often a long and tedious business. Central African Airways already operate services from Livingstone to Johannesburg, Bulawayo, Salisbury, Blantyre, Lusaku, N'dola, Tahora, Dar-es-Salaam and Nairobi. Zambesi Airways, Ltd., is the locally based charter company. A steady flow of visitors to the Victoria Falls can also be relied upon to patronize Livingstone airfield and town.

Lord Pakenham, Minister of Civil Aviation, will perform the opening ceremony in the presence of H.E. the Acting Governor, Mr. R. C. S. Stanley, C.M.G., O.B.E. (the Governor, Sir Gilbert Rennie, is on leave in this country), and invitations have been sent by the Northern Rhodesian Government to Sir Arnold Overton, Air Chief Marshal Sir Frederick Bowhill, Lord Brabazon and Mr. R. E. Hardingham, to ministers and attachés in South Africa and Nyasaland, and to representatives of airlines and directors of aircraft companies. A flying display has been arranged to mark the occasion, and will commence when Lord Pakenham orders the first aircraft—a Miles Gemini—to take off. Harvards and Vampires of the Rhodesian Air Training Group and South African Air Force are expected to give individual and formation displays, and civil and military transports—Hermes, Marathon, Constellation, Viking, Hastings, Lodestar—will be demonstrated.

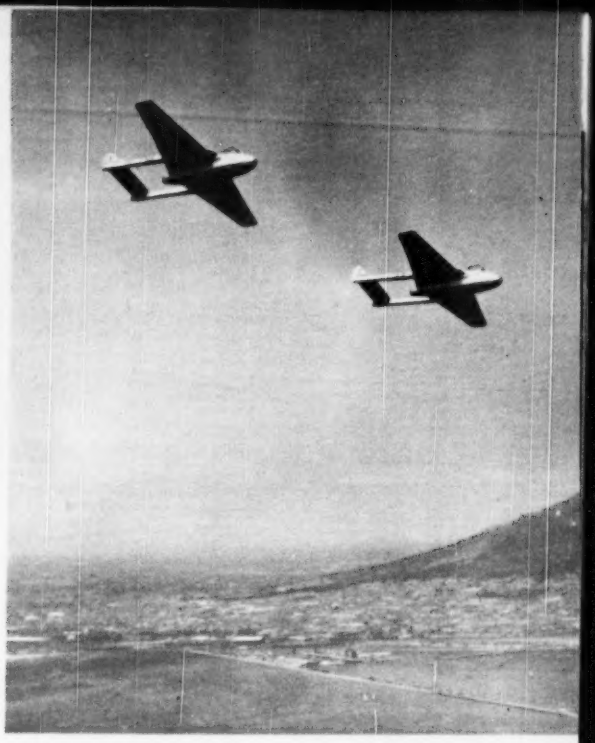
S.A.A.F.

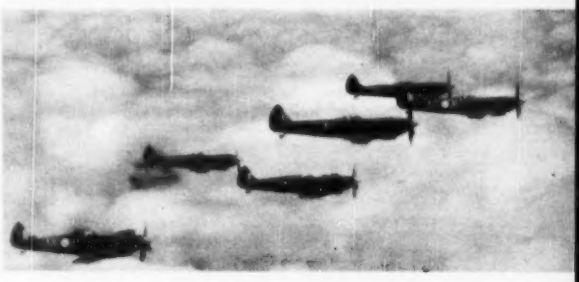
Vampires to Perform at Livingstone

MANY of the visitors who will flock—truly from "far and wide"—to witness the inauguration of Northern Rhodesia's fine airport on August 12th, will be seeing jet aircraft for the first time, for the South African Air Force is paying its respects on that occasion with a flight of de Havilland Vampire 5s, two of which are seen at top right exercising over Table Bay. These fighter-bombers are recent acquisitions, the greater part of the S.A.A.F. fighter force still being composed of Supermarine Spitfire 9s, represented on the right by a "fluid six" formation of No. 1 (City of Pretoria) Squadron. Short Sunderland V flying boats, one of which is shown below at close quarters and on half-power, are rendering excellent service in the maritime reconnaissance role.

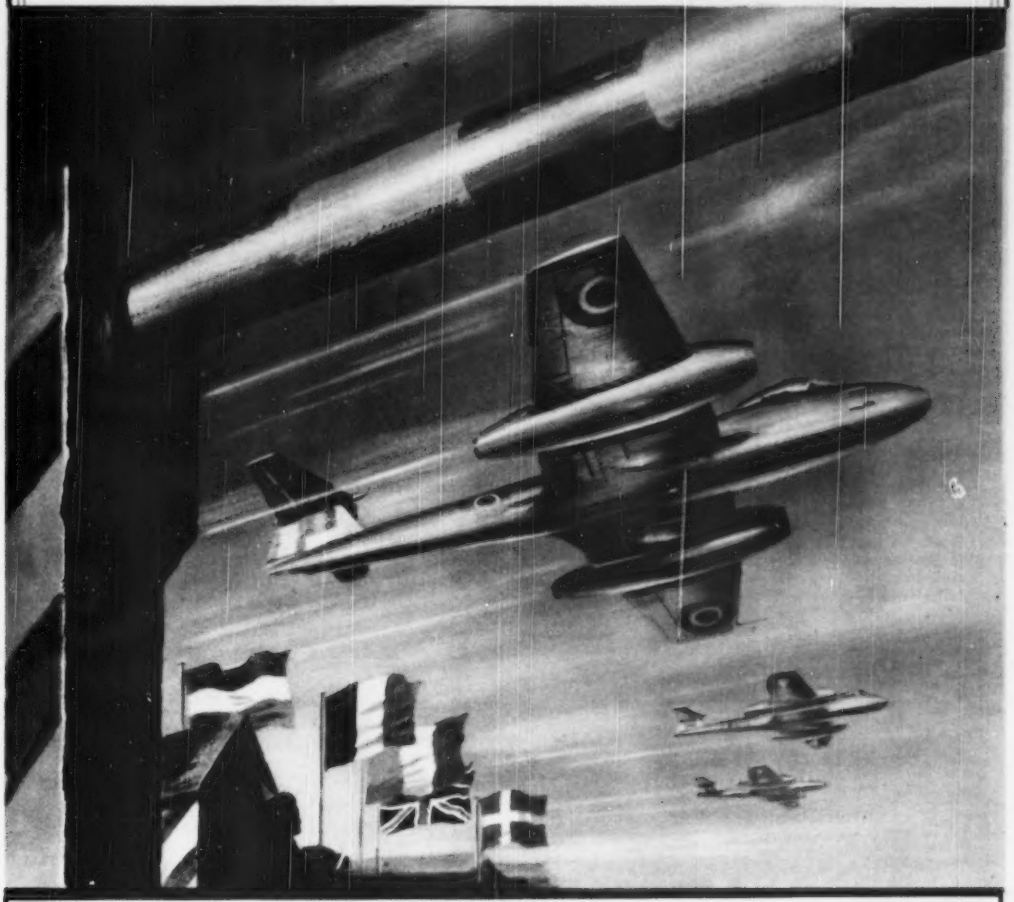
Director-General of the S.A.A.F. is Brigadier J. T. Durant, C.B., D.F.C., seen at the head of the page at his Roberts Heights (Pretoria) Headquarters.

Harvard trainers will be presented at Livingstone by the Rhodesian Air Training Group and the Southern Rhodesian Auxiliary Air Force. Civil participants are mentioned on page 177.





STRENGTHENING THE FRONTIERS OF FREEDOM



Yet another version of the versatile

GLOSTER **METEOR**

will be exhibited at the

S.B.A.C. Farnborough Show

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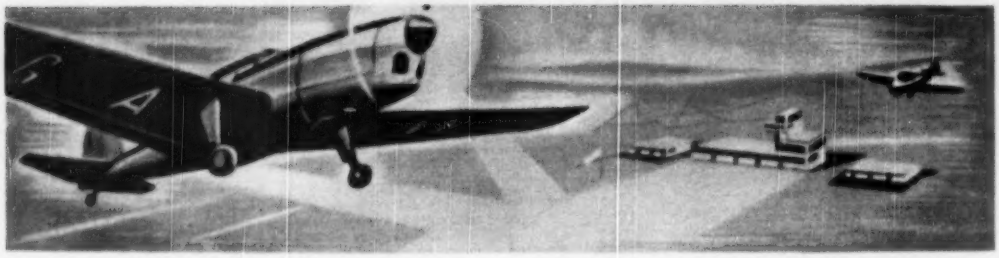
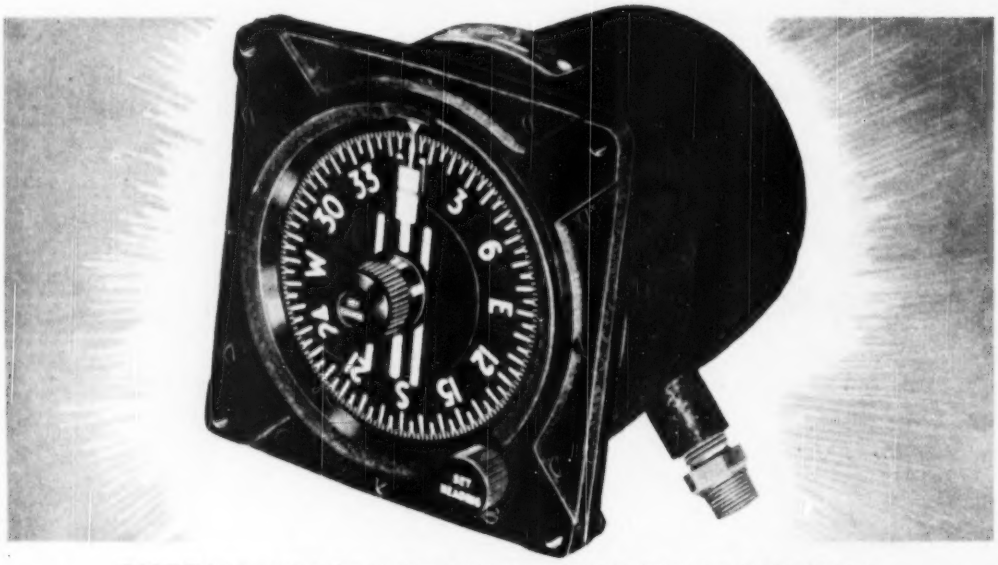


Smiths Air-driven Directional Gyro

To meet the need for a less restricted direction indicator, SMITHS have recently developed this air-driven directional gyroscope. The instrument has freedom of the inner gimbal ring up to ± 85° so that the gyro can only be 'toppled' when a loop or roll is made *directly* about the axis of the inner gimbal ring. The instrument has the additional advantage of being identical in card presentation with the latest Air Ministry and Airline specified gyro-magnetic compasses. When installed in training aircraft, the pupil is made familiar with the presentation used in operational aircraft. Where an air-driven indicator is required as a standby to the electrically operated gyro-magnetic compass, in airline use, the similarity of presentation is again a great advantage. The card can be reset with the magnetic compass under any flight conditions or on the ground, without caging the gyro and the course pointer is operated independently through a reducing gear that facilitates accurate setting by the pilot.



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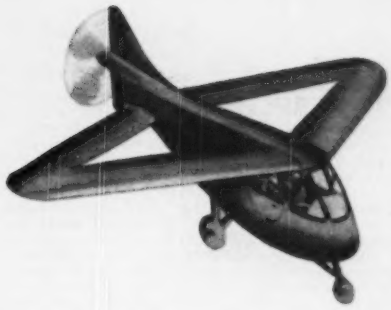


An artist's impression of the unconventional Warren-Young Skycar

DESIGN OF TAILLESS AIRCRAFT

Some General Considerations and Notes on the Warren-Young Project

By NORMAN HALL-WARREN

THE conventional aircraft having a mainplane and tailplane has not necessarily the ideal arrangement of aerofoils and it is the recognition of this fact which has prompted, from time to time, the construction of experimental unorthodox types. In the past such aircraft have been viewed as freaks and prejudice has invariably succeeded in both damping the ardour of the inventor and preventing the subscription of the funds required for development. This state of affairs still prevails, but it is now becoming apparent that scepticism will not in the future be so fashionable as in the past. At the present time, and in many countries, odd-shaped tailless aircraft are under construction or are already flying, and have, moreover, been sponsored and paid for by the several governments concerned.

It is the purpose of this article to give the reason for the unconventional trend and also to compare the merits and defects of the various types, with particular reference to the Warren-Young design.

The discussion is concerned with the characteristics of aircraft designed to travel at moderate speeds, although the requirements for the high-speed machine and the tailless type, as such, are similar. For example, the requirements for the "supersonic" aircraft are a low thickness-chord ratio and sweepback, and these conditions are met by the delta wing, which is also a suitable plan-form for the tailless aircraft. The disc wing ("Flying Saucer"?), or the delta wing of very low aspect ratio, each with its characteristic high lift developed at large angles of attack, also permits an exceptionally slow landing approach, so that the conditions for a low wave drag and high lift at low speeds derive from the same type of wing formation. The characteristics of the tailless aircraft at moderate and low speeds may have, therefore, an important bearing on the design of high-speed types.

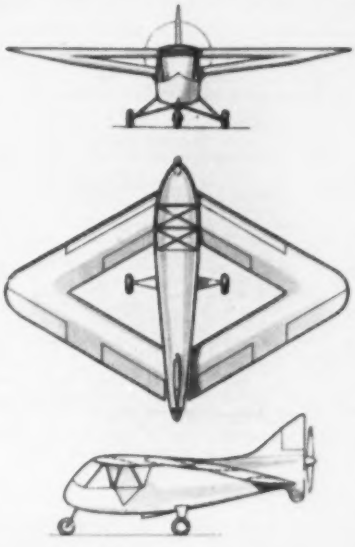
The conventional monoplane, with a tapered, unswept and non-twisted wing develops, as compared with any tailless type, a higher lift per unit of wing area at all angles of attack; therefore, for a given speed, the angle of attack required for flight will be lower and the parasite drag will be less. The induced drag will also be a minimum for this type of wing, with the nett result that the speed will be higher for a given horse-power. It should be observed, however, that the increase of profile and body drag with angle is very small and also that, at low angles of attack, the induced drag is a small proportion of the total drag. At low angles, therefore, these gains will not be substantial and the improvement in top speed will usually be negligible; moreover, the advantage in cruising speed is likely to be slight.

Against these slender advantages, the "efficient" aircraft is subject to the sudden stall, with which is associated the initially uncontrollable dive and tendency to spin, and this vice may be corrected only by a substantial sacrifice of the efficiencies already considered.

The tailless design which employs a swept-back wing having washed-out tips may next be considered. Most tailless aircraft have been, or are, of this type—for example, the Westland-Hill Pterodactyl and the Northrop Flying Wing. For the true all-wing type the parasite drag is much less than that of the conventional aircraft, as the body drag is eliminated entirely. In fact, the minimum drag coefficient for the Northrop B-35 bomber is less than half the average figure for the comparable conventional aircraft. In addition, the elimination of the fuselage and tail surfaces results in a considerable saving of weight and resultant improvement of payload. For example, for a conventional aircraft of similar size to the B-35, the weight of the fuselage and tail would be of the order of seven tons. Tailless types other than the all-wing must justify their existence with other advantages, since their parasite drag may not be abnormally low or their structure be unusually light. The claims for such types have usually been for improved stability and innocuous stalling, but in fact most tailless designs have inherent defects which tend to nullify the advantages.

The disadvantages inherent in almost all tailless types are as follows. A large tip-washout is an essential condition for stable trim, since the no-lift moment of any type of aircraft must be positive (i.e., nose-up). At the zero lift angle, therefore, the negative lift at the swept-back tips must equal the positive lift at the inner parts of the span and thus, at all angles of attack, the lift coefficient of the outer parts of the wing will be less than that of the centre parts. The new C_L at a given angle of attack is then always below optimum and this, without exception, is a characteristic of tailless aircraft of all kinds. Furthermore, to achieve a high value of the maximum lift coefficient, which is essential for a low landing speed, flaps must be employed to raise the subnormal $C_{L\,max.}$

This introduces a major problem. The downward deflection of a flap has the effect of moving the centre of pressure of a wing rearwards and creates a considerable nose-down pitching moment. In the conventional aircraft this moment is balanced



WARREN-YOUNG SKYCAR DATA
(180 h.p. Cirrus Minor)

Accommodation	Two, side by side
All-up weight	1,650 lb
Span	30ft
Length	22.8ft
Front and rear half-wing area	40.7 sq ft
Tip area	29.6 sq ft each
Gross area	222 sq ft
Wing chord	4.25ft
Tip chord (max.)	8.5ft
Front wing- and tip-incidence	5 deg
Rear wing incidence, root	1 deg
Rear wing incidence, tip	5 deg
Front wing- and tip-dihedral	0 deg
Rear wing dihedral	8 deg 30 min
Front and rear sweep angle	30 deg
Aerofoil section	N.A.C.A. 23012

(tip t/c modified to 6 per cent)

DESIGN OF TAILLESS AIRCRAFT

by a down load on the tailplane, which, incidentally, appreciably reduces the nett C_L available. With the tailless type, the flaps are located at the inner parts of the wing and the diving moment is balanced by the moment of up-turned elevator surfaces, which are located near the swept-back tips. These elevators have a relatively short arm about the centre of gravity, however, and in consequence the required anti-lift loads are high, resulting in a reduction of the C_L of the wing. Unfortunately, the up-turned elevators will also reduce the camber of the wing in their vicinity, by introducing reflex curvature, and the lift is thus further reduced. Lengthening the elevator arm about the c.g., by increase of sweep-back, is no cure for the balance trouble, as it tends to reduce the aerodynamic effectiveness of the flaps. Finally, to make matters worse, trailing-edge flaps inordinately reduce the stalling angle of a sweptback wing and the nett result of all these effects is a low C_{Lmax} of between 60 and 80 per cent of the trimmed C_{Lmax} of the conventional aircraft. For the same landing speed, therefore, most tailless types must have a much larger wing area than the conventional aircraft, resulting in additional weight and an increase in profile drag.

Additional defects inherent in this tailless class relate to stability. Swept-back wings are prone to stall prematurely at the tips* and with the tailless type a tip stall will increase the nose-up pitching moment, thus stalling the aircraft further. This redistribution of lift due to burbling of the parts of the wing remote from the aircraft c.g., and its effect on trim and stability, presents a major problem. The stall may, therefore, be particularly vicious and likely to lead to dangerous instability. An additional form of instability results from the sweep-back introducing an effective dihedral, which, with the degree of sweep required for a tailless design, may be abnormally large at high angles of attack. This effect, coupled with the characteristically low weathercock stability, may give rise to a rolling oscillation combined with tail wag, known as the Dutch Roll, a most undesirable motion which, in most tailless types, is very lightly damped. Finally, longitudinal oscillations are less damped than with the conventional aircraft and it is on record that certain tailless types have proved difficult to handle and have exhibited vicious instability.

It is clear, then, that design of the typical tailless machine presents many problems and that most of these problems have, so far, defied a satisfactory solution. It is therefore worth considering whether there is an entirely different wing-form which will solve these difficulties, and this leads to a consideration of the Warren-Young design.

The Warren-Young wing is illustrated in the perspective and general arrangement drawings of the Skycar, which is a prototype based on model research. The wing consists of a system of swept-back front planes and swept-forward rear planes, with the front and rear aerofoils merged in semicircular tip surfaces. The rear planes are twisted and wash-out towards the roots, which are well below the roots of the front planes.

Successful Model Research

The Warren-Young wing was originated by the writer, who, with the invaluable assistance of Rex Young, his partner in the venture, carried out a research programme in 1937. After successful research with free-flight models, patents were secured and the design of the prototype was well advanced when the outbreak of war called a halt to these activities. Since then, no opportunity has arisen to build this interesting aircraft, which has none of the major defects inherent in the tailless designs at present favoured. It is significant that a well-known authority on tailless types, Mr. A. R. Weyl, A.F.R.Ae.S., has quite recently stated that the Warren-Young is based on sound aerodynamic considerations and has suggested that it is worthy of further development—surely a unique compliment to the modern design of a 13-year-old project!

The Warren-Young design has the following advantages:—

(1) An abnormally high flaps-up C_{Lmax} will be developed at a high angle of attack. There is no critical angle and stalling will increase very gradually and without unstabilizing effects. Most tailless types develop a very low unflapped C_{Lmax} and the stall is sometimes associated with loss of static stability.
(2) A considerably higher flaps-down C_{Lmax} will be attained compared with other tailless designs, for which the flapped C_{Lmax} may be as much as 40 per cent subnormal.
(3) The Warren-Young will be laterally stable at all angles of attack; most tailless types have a tendency for lateral instability.
(4) It will be more directionally stable than other tailless types, which tend to be very deficient in weathercock stability.
(5) Dynamic longitudinal stability will be satisfactory. Other tailless types have a very low damping in pitch, often no more than 1/10th that of conventional aircraft.
(6) The specific strength of both wing and fuselage structure will be high in comparison with that of all other types of aircraft.

These claims may now be discussed in detail. The stall, as commonly understood and associated with instability and loss of control, will not occur with the Warren-Young. The high angle of maximum lift is far removed from the normal flying angles and the slow and regular increase of burbling renders the stall harmless; neither effective loss of lift nor unbalancing effects will occur. A gradual onset of the stall means that burbling does not begin simultaneously at all part of the wing surface, or that the progress of chordwise flow separation is slow; and although these conditions give the desirable flat-top lift curve, it can also mean that the centre of pressure may move so as to cause large changes of trim, or even instability. With tailless aircraft, which have an abnormally large longitudinal extension of wing surface, it is of paramount importance that prematurely stalled areas of wing should not give rise either to large nose-heavy moments, or large nose-up moments. The occurrence of a large nose-down moment at an angle below that of the maximum trimmed lift will not only reduce the C_{Lmax} available, but will result in a sudden and initially uncontrollable dive. This has, in fact, been a frequent cause of serious accidents with so-called "safety" aircraft. The premature stall of rearward areas of wing, causing nose-up moments, is equally dangerous and may result in looping.

With the Warren-Young wing it would be unfavourable for stability if the root region of the rear planes developed a premature stall, as usually occurs with a swept-forward aerofoil. But, in fact, this tendency will be combated, first by the reduced incidence of the root sections† and, secondly (for the Skycar with power on), by the flow-energizing effect of the increased velocity of the stream approaching the airscrew. The precise way in which burbling will develop and spread depends upon so many variables that it is impossible to be dogmatic, but unfavourable effects can certainly be avoided by appropriate adjustment of the wing section constants in the design stage. It seems likely that, due to the rear plane washout and downwash effect on the rear surfaces, a part of the front planes must reach maximum lift before the rear planes, which will, if the stall is only partial, result in a gentle nose-down pitch and the unstalling of the front surfaces. If, as is theoretically indicated, the control surfaces remain unstalled, however, it should be possible further to increase the angle of attack and reach a still higher lift coefficient, when the aircraft will be slightly stalled at the maximum lift angle.

The very gradual stall coupled with maintenance of control will allow the Warren-Young to make landing approaches at maximum lift and therefore at the lowest possible speed in level flight. Moreover, glides and also power-on descents beyond the angle of maximum lift may be a safe flying technique, when the forward speed will be exceptionally low and the aircraft will descend in an almost vertical path.

The relatively high value of C_{Lmax} derives from the delayed stall, which depends upon the properties of swept wings. A swept-back wing burbles prematurely in the region of the tips, whilst a swept-forward wing has a more delayed stall, which eventually begins near the root. The cause of these effects is as follows. With a swept-back wing the chordwise pressure-pattern is progressively staggered rearward as the tip is approached, which means that, in a spanwise direction, the negative pressure on the upper surface for adjacent chords is greater for the outer chord (except very near to the leading edge) and, therefore, there arises a spanwise pressure-gradient with pressure decreasing towards the tip. This results in an outward drift of the boundary layer which will carry away any stale fluid tending to collect in the inner region of the wing. At the tip, however, there is an inflow due to exchange of pressure from the lower to upper wing surface, and this neutralizes the outward flow, causing fluid to accumulate and resulting in burbling. In addition, sweep-back increases the tip upwash and thus the local angle of attack is increased, aggravating the tendency for an early tip-stall. With a swept-forward wing, on the other hand, by similar reasoning there will be a pressure drop towards the root, resulting in a boundary-layer flow in this direction. But in this case the tip inflow is not opposed to the sweep induced flow; it will increase its energy and thus delay burbling, which will eventually start in, and spread from, the root region. The result is that for the swept-back and swept-forward wing burbling spreads slowly, producing a smooth flat-top lift curve for both wings, but with a higher C_{Lmax} for the forward-swept aerofoil.

In the Warren-Young wing, the front swept-back planes are joined via tip surfaces to the rear swept-forward planes and this arrangement will prevent the early tip stall by influ-

* *Even with tip-washout and reflex induced by up-elevator some flow separation may occur at moderate angles of attack.*

† *This washout is also a necessity for the stable trim of the aircraft at all angles below the stall.*

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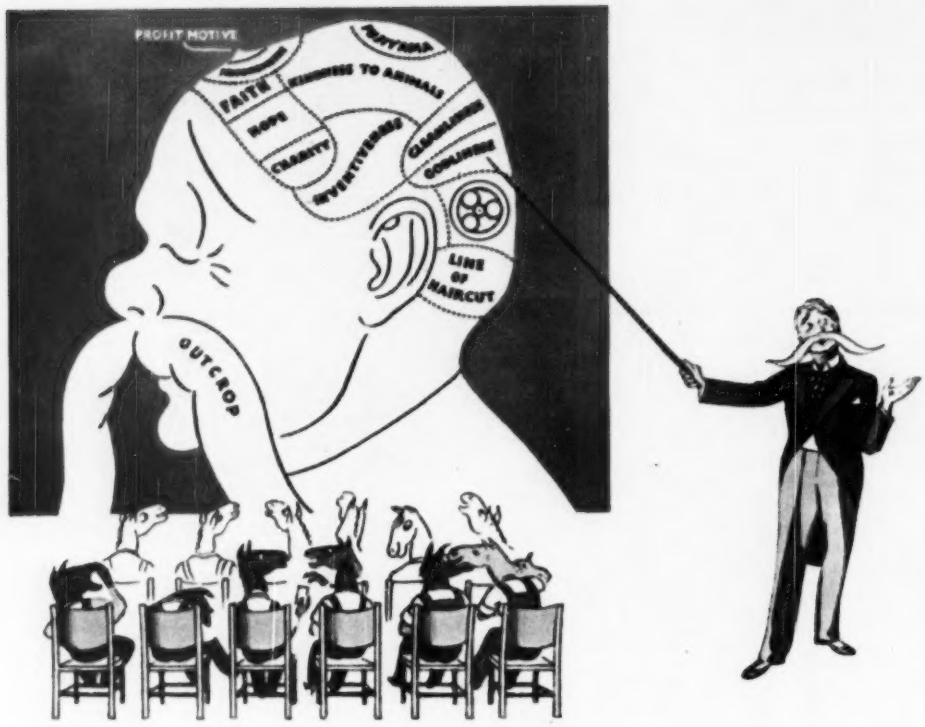


In response to wide public demand for more technical facts and less damfoolery in Desoutter advertising we now explain in simple but quite incomprehensible terms how Desoutter Tools get to be the way they are. As every schoolboy knows, Desoutter Tools are lighter, smaller and more powerful than any small tools that are heavier, bigger and feebler. How come? Well, smatter of fact, it is due to a number of things; the shape for instance and the fact that we keep putting more and better works inside the shape without increasing the size. And the air has something to do with it too. It stays cooler longer in Desoutter Tools. Curious isn't it? We must look into it. But chiefly, of course, the superiority of Desoutter Tools is due to our brains, which—though small—are ve-ry ve-ry superior.

Desoutter

POWER TOOLS INCREASE PRODUCTION

DESOUTTER BROS. LTD., THE HYDE, HENDON, LONDON, N.W.9. TELEPHONE: COLINDALE 6346 (5 lines). TELEGRAMS: DESPNUCO, HYDE, LONDON.

Estate manager covers 1,000 miles in a day . . .

"The trouble with my job has always been an extended line of communications. It's pretty hard to get around on a rocky, wooded island with no railways, and precious few roads. Some of the estates and plantations, which my company is operating, are 400 miles 'up country' and the business of maintaining contact with the stations in the furthest districts under my control was costing me a lot of sleep and a lot of time. I suppose, too, this lack of liaison cost the company a lot of money.

"But that's all over now. Since the company brought a Sealand out here, and based it on the capital (where we do the office work), I've got around quite a bit. Yes, I should think I cover about a 1,000 miles on some days.

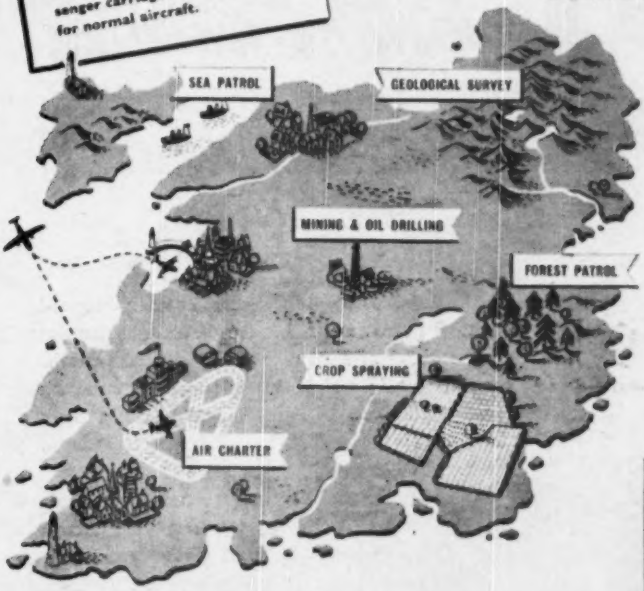
"It's a remarkable plane this Sealand. I've used it continually for all kinds of work. Its main value to me is that it takes my office right to the places where work is in progress on the crops. We can put it down even in the thickest jungle, as long as there's about 800 yards of lake or river to operate from. Sometimes, on the trip back, we fill her up with a tidy amount of freight — I've taken 1,000 lbs. of pineapples over the 500 miles from the East to the West Coast, without refuelling. And that's getting better than 6 air miles per gallon.

"Once a week I use the Sealand on forest fire patrol, and before harvest time we fit her up for crop spraying. It doesn't seem to matter what I want—an ambulance, a bus, or a truck—the Sealand is always ready to go anywhere."

● Shorts have designed the Sealand for all areas in which the conditions of this island are repeated, when freight and passenger carriage is impracticable for normal aircraft.

Engines: *2 Gipsy Queen 70, developing 345 B.H.P. each at take-off.*
Accommodation: *5/8 seater.*
Speeds: *196 m.p.h., all-out level. 155 m.p.h., max. weak cruising.*
Range: *600 statute miles at 127 m.p.h. with 1,000 lbs. freight. 315 statute miles at 127 m.p.h. with 6 passengers and baggage plus 80 lbs. of freight.*
Service Ceiling: *21,000 feet.*
Rate of Climb: *840 feet per minute at sea level.*
Take-off: *Water 835 yards. Land 450 yards.*

All figures at an all-up weight of 9,100 lbs.



★

IN any difficult region that is being developed — in Northern Canada, in South America, or in the East Indies, for example — the Short Sealand is the logical answer to the problem of transporting men or freight. It is as well suited to private owners and industrial concerns as it is to air-charter and feeder-line companies.

★

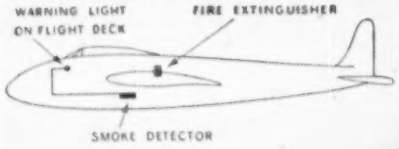
SEALAND
AMPHIBIAN

Shorts THE FIRST MANUFACTURERS OF AIRCRAFT IN THE WORLD

SHORT BROTHERS & HARLAND LTD., QUEENS ISLAND, BELFAST

This compact unit weighs only 2.75 lbs. and has an overall size of 11⅛" × 3¾" × 4½".

The diagram shows how the "PYRENE" Smoke Detector can be installed in an aircraft to give warning in compartments not accessible during flight. A test circuit and reset switch are provided for easy checking of the equipment.



GIVES ITS OWN

instant warning

with the

AIRCRAFT SMOKE DETECTOR

(Type P.S.D.A.I.)

Provisionally approved by The British Air Registration Board, Ref. No. E.953

The "PYRENE" Smoke Detector is a constant guard against fire whether the aircraft is in flight or standing on the airfield. Immediately smoke occurs in the compartment in which the detector is installed, a visual and/or audible alarm is given on the flight deck. Action can then be taken immediately to extinguish the fire before it has a chance to develop.

This new "PYRENE" invention is rapidly being taken up by progressive aircraft manufacturers and airline companies. Full details will gladly be supplied on request to Dept. F.

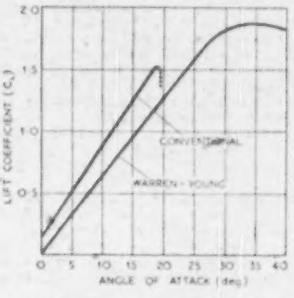
THE PYRENE COMPANY LIMITED
9, Grosvenor Gardens, London, S.W.1.
Telephone: VICtoria 3401
Head Office and Works:
Great West Rd., Brentford, Middx. EALing 3444

Pyrene TRADE MARK FIRE APPLIANCES

DESIGN OF TAILLESS AIRCRAFT . . .

encing the boundary flow as follows. The energetic inward flow along the upper surfaces of the rear planes will scour the tip regions and remove stale fluid, which would otherwise give rise to burbling. Also, the large relative chord of the tips will cause dilution of the tip upwash and will, therefore, reduce the local C_L increase induced by the sweep-back. The elimination of the causes of early stalling will result in a linear increase of C_L being extended to higher angles of attack and thus the attainment of a higher $C_{L max}$; but since not all parts of the wing will be operating at the same effective incidence or will have the same form of chordwise pressure distribution, burbling will not begin simultaneously. Moreover, due to the sweep-induced boundary layer control, the chordwise spread of the stall will be slow.

These effects are illustrated below, where is seen a calculated C_L curve for the Warren-Young wing, based on test results for swept-back and swept-forward aerofoils and considered as a tandem system with a negative decalage. A reasonable allowance for a delayed stall, due to elimination of early tip-burbling, has also been made. Also shown for comparison is a curve for a typical unswept wing of efficient planform, both curves being for the flaps-up condition. The curve for the Warren-Young wing shows that burbling commences at a higher angle of attack than with the conventional wing and also that the increase of burbling is very slow. The $C_{L max}$ developed is, however, considerably higher than the conventional and occurs at an angle of attack of over 30 deg. The normal wing is seen to stall suddenly at about 19 deg, a potentially dangerous characteristic, typical of all efficient aerofoils. The relative reduction of C_L at moderate angles, and compared at a given angle, which is revealed by the Warren-Young curve, will not result in a significant increase of drag at maximum cruising speeds. Compared with the flaps-down $C_{L max}$ of the usual tailless type, the Warren-Young unflapped $C_{L max}$ will be substantially greater. For example, the maximum lift coefficient attained by the Northrop Flying Wing is only 1.5, which is no higher than the $C_{L max}$ of an unflapped aerofoil of efficient planform. The Warren-Young wing, on the other hand, is expected to develop an unflapped $C_{L max}$ above 1.8, which will be further increased by use of flaps.



Calculated C_L curve for Warren-Young wing.

Flaps can be used on the Warren-Young aircraft without penalizing the lift and, also, it can be trimmed to fly at large angles without incurring anti-lift loads. The trailing-edge flaps, which also act as elevators, are located at the inner parts of both front and rear planes and the moments about the centre of gravity of the lift increments from the flaps, when both flaps are moved down, are therefore opposed and mutually balancing. This means that the C_L of the wing can be increased without change of trim and also that by downward deflection of the front control surfaces alone, the aircraft can be trimmed nose-up by an increase of up-load instead of by a decrease, as with other tailless and normal types. It is true that the change in positive moment about the c.g., due to the front flaps, may not be large, but the resultant pitching moment will be increased due to some reduction of effective incidence of the rear planes, caused by increased downwash, and resulting in a reduction of their negative moment (but with small loss of C_L). For flight at the pre-flapped attitude, the resultant positive moment will, however, be balanced by an increased up-load (down-flap) on the rear planes, thus increasing C_L. In addition to trailing-edge flaps, nose flaps will probably be advantageous for the front planes of the Warren-Young wing, and these are shown in the general arrangement drawing of the Skycar.

With regard to lateral stability at high angles of attack, the Warren-Young wing will maintain damping in roll, due to the absence of tip stalling. Moreover, the tendency for lateral oscillations will be opposed by the relatively large weathercock-stability as compared with that of other tailless types; this, coupled with the anti-dihedral influence of the rear plane sweep-forward, will cancel out the unstable effect of the swept-back front planes. As for dynamic longitudinal stability, oscillations should be heavily damped by the relatively large areas of wing surface disposed at an effective arm about the centre of gravity.

In addition to direct aerodynamic advantages the Warren-Young aircraft shows substantial gains in specific strength and structural stiffness. First, due to division of lift between front and rear planes, the span compared with other monoplanes is less for a given wing loading. The relatively short span increases the stiffness and reduces the weight of the wing structure, which effects are further enhanced by the triangulated geometry of the wing. The fuselage loads are also minimized by the application of the lift loads at two widely separated positions.

This latest of the Warren-Young designs will have the qualities inherent in the Warren-Young wing, but this aircraft is also an advanced design in other respects. For instance, the airscrew is at the extreme rear of the fuselage and is driven by a shaft from the engine at the rear of the cabin. All recent designs embodying this arrangement were preceded by a Warren-Young design projected in 1937 and described and illustrated in a patent specification of that date. (British Pat. Spec. No. 508,022 of December, 1937.) This disposition of the airscrew is advantageous for a single-engined aircraft and, in addition to increasing propulsive efficiency and decreasing body drag, it will improve the comfort of the pilot and passenger by elimination of slipstream-buffeting and by reduction of noise and fumes in the cabin. Finally, there is the very important advantage of an unobstructed field of vision.

The Warren-Young Skycar will have a top speed and also a minimum level flying speed closely comparable with those of a similarly powered and loaded conventional aircraft. With a maximum speed of 118 m.p.h. and a minimum air speed of 38 m.p.h., the Warren-Young will not be inferior to the comparable aircraft of normal type, but the Skycar will probably have the advantage of being able to fly much more slowly than the minimum level speed and will descend parachute-fashion, remaining stable and under complete control.

GAS-TURBINE COURSES

THE only institution of its kind in the world, the School of Gas Turbine Technology is to reopen in October in new quarters at Farnborough. Founded in 1944 to instruct Dominion Air Forces personnel, it was originally operated by the National Gas Turbine Establishment at Lutterworth, and in 1948 was taken over by Power Jets (Research and Development), Ltd. (A notable appointment to the latter company is, incidentally, recorded on p. 165.) The move to Farnborough is necessitated by expansion of the School's activities.

There is a wide range of gas turbines and equipment, including test houses and a jet aircraft on which installation and practical ground instruction is given. On every course actual test-bed runs of turboprops and turbojets are undertaken by the students themselves.

The courses are of one, two or three weeks' duration. In addition to the various special courses, the standard syllabus may be broadly classified under four headings: Industrial gas turbines; aircraft engines; aircraft engines (practical); and an "international" course covering the whole gas-turbine field. As the word "international" suggests, the last-named course is open to students of any nationality; the others are confined to British students only.

The principal of the School is Mr. D. L. Brown, A.M.I.C.E., M.I.Mech.E., M.I.G.E., A.F.R.Ae.S. A brochure containing details of the courses and fees can be obtained from the School of Gas Turbine Technology, Farnborough Place, Farnborough, Hants.

CABLE AND PIPE CLIPS

A NEW range of lightweight plastic cable and pipe clips introduced by the Synthetic Carbon & Engineering Co., Ltd., Cumberland Road, Stanmore, Middlesex, appears to have numerous possibilities in application to aircraft.

The standard range of clips covers pipe outside diameters of from $\frac{1}{8}$in up to 2in, in increments of $\frac{1}{16}$in up to diameters of 1in, and thereafter in increments of $\frac{1}{8}$in. Special shapes and sizes can, however, be produced to order. The clips are stated to be strong, resilient, rust-proof, weather-resistant, rot-proof and to have a high insulation value. Electrolysis cannot take place at fixing points, and clip edges are radiused to avoid any possibility of chafe.

CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

Prestwick Prison?

BLACK and white it stands, this stone wall between the highway and the airport at Prestwick (see picture). Does it do any good?

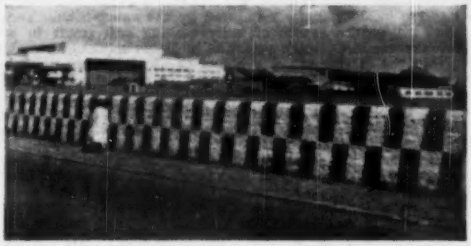
Well, it does prevent the pedestrians from looking down the runway, if that is any good.

As an airline pilot, I don't see the reason for having this obstruction only approximately 100 yd from the end of runway 31. Every day lots of heavy transport aircraft are taking off from, or landing on, this runway. Aircraft have rolled off the end of a runway before, and it may happen on this one too. I hope not to be in the cockpit if and when that happens.

I am sure there must be good reasons for that stone wall, but I cannot see them and would be glad to have them pointed out.

AIRLINE PILOT.

Stockholm.



The wall at Prestwick, referred to here by "Airline Pilot."

Rudolf Hess Relic

THE fantastic episode of Rudolf Hess's flight to Britain in May, 1941, and the crash-landing of his aircraft in a field at Floors Farm, near Newton Mearns, Renfrewshire, has been revived as a topic of conversation by Mr. Churchill's reference to the incident in his third volume of war memoirs.

I wonder how many Scots could say offhand where the engine of the Me110 which he piloted from Augsburg can be seen to-day? Quite by accident I found the answer when, during a London visit, I went to the Imperial War Museum in Lambeth Road. It is displayed there.

It occurs to me then that, in view of the Scottish aspect of the strange story, a more appropriate resting place for the historic engine would be the Glasgow Gallery at Kelvingrove Park.

J. C. L.

Glasgow.

Cloud-boring

ON a recent Monday, at 14.50 hours B.S.T. I saw over London a phenomenon, details of which might be of interest to other readers.

I was prompted to look up by the whine of a jet aircraft. I did not see it, but I saw its aftermath, in the form of a double tunnel through a thin layer of cloud at about 5,000ft. Presumably the aircraft was a Meteor and its two jets had each burnt a hole through the cloud, i.e., the jet had raised the temperature of the local air above the dew-point, so that cloud particles were re-absorbed as vapour. In other words, there was local desaturation. At least, this is my tentative explanation.

I wonder if any meteorologist has observed the same or similar phenomena, and whether my explanation is correct.

The effect might be termed "negative vapour trails."

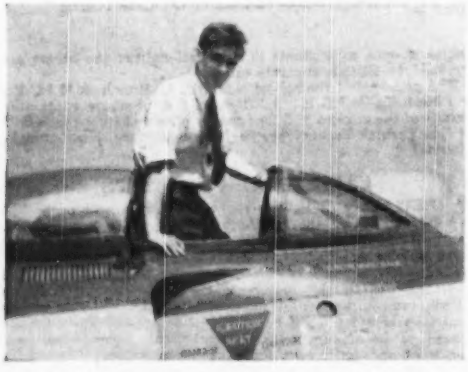
London, S.W.16. RESERVIST.

G.M. FOR SUPERMARINE PILOT

EDITORIAL comment is made in this issue on the recent exploit of Leslie R. Colquhoun, Vickers-Supermarine test pilot, whose courage in bringing in an Attacker jet fighter back to base with an outer wing panel folded vertically has earned him the George Medal.

Colquhoun was carrying out high-speed tests on the first production Attacker when, at a height of 1,000ft at a very high speed, the outer portion of the starboard wing folded up, and remained, vertical. Aileron control was ineffective, but Colquhoun found that, by the use of full left rudder and by maintaining a speed in excess of 200 knots, he could retain some measure of control. The citation states that he would have been fully justified in abandoning the aircraft but, realizing the importance of investigating the failure quickly, and the delay which would be involved if the aircraft were damaged so extensively as to conceal the original cause, he decided to attempt to land. By skill and judgment of a very high order he set the machine down, enabling the cause of the failure to be quickly ascertained and rectified.

Colquhoun is 29. A former flight lieutenant, he flew Spitfires on reconnaissance from Malta during 1942, and operated from North Africa and Italy in 1943-44. He was awarded the D.F.M. and D.F.C., and after the war was seconded to Vickers-Supermarine as a test pilot, later joining the company.



Leslie Colquhoun in a Vickers-Supermarine Attacker.

YPENBURG DISPLAY

(*Continued from page 166.*)

formation aerobatics, while the solo demonstration by their Capt. Vincent Gordon was literally breath-taking. He is probably the only man who can boast of having flown at 600 m.p.h. below sea level, for he flashed past 10ft from the grass—and Ypenburg Airfield lies 15ft below sea level!

The Swiss contribution began with some fine aerobatics by a Bücker Jungmann of the Basle Aero Club, followed by a simultaneous sailplane display by two towed Grunau Babies and a Kranich. Hans Walti, a young Swiss, performed on a (literally) flying trapeze, hanging head-downwards on a 300ft rope-ladder trailing from an Auster.

The Fokker Works showed its S.11 Instructor, skilfully flown by Chief Instructor Daan Lambermont, deputizing for Gerben Sonderman, who had been busy ferrying the royal Dakota from America.

A high-spot of the meeting was the unique formation aerobatics of the French Escadrille d'Etampes under Capt. Perrier and, on the second display day, under Lt. Guido; the Stampe biplanes' outside loops and inverted climbs, in the bumpy weather which prevailed, were almost unbelievable. Marcel Doret next showed that, despite his 54 years, he is still a brilliant performer on his 20-year-old Dewoitine 27 fighter; his "dead engine" aerobatics were particularly appreciated.

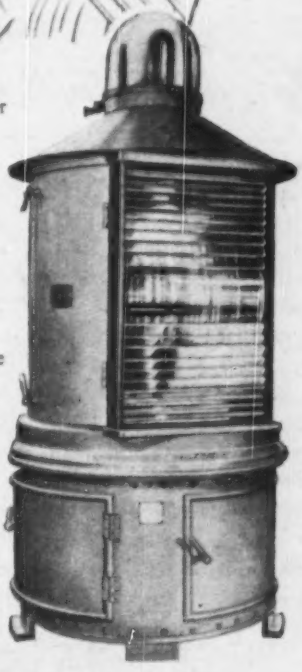
Four B.A.F.O. Vampires, in formation aerobatics, showed the skill of their pilots to be (in the opinion of one expert observer) "beyond all praise."

A picturesque touch was given to the meeting by a rally of private owners from the various Dutch provinces, with the pilots and passengers dressed in the various local costumes. On the last day the Dutch Parachutist Club gave a demonstration of formation jumping.

H. S.

SQUARE FOR SAFETY

The sooner a pilot spots the location beacon that marks his destination the easier and safer his landing. The range of visibility depends on three things . . . intensity of beam, duration of flash, angle of view. The Chance 'Square Beam' Airport Location Beacon generates a greater intensity of beam, gives a constant duration of flash to the uppermost limits of the angle of view and sends a powerful light skywards; it exceeds in every respect the standards laid down by the International Civil Air Organisation. The 'Square Beam' provides a foretaste (and no ordinary one) of the many improvements Chance Brothers mean to give to navigational lighting in the future. An illustrated folder containing full details will be forwarded on request.



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WORLD-WIDE RELIABILITY

by

TEDDINGTON CONTROLS

APPROACH MAPS BY COURTESY OF MESSRS. INTERNATIONAL ARRAMO LTD.

DON MUANG AIRPORT (BANGKOK)
Lat.: 13° 54′ 42″ N. Long.: 100° 36′ 30″ E. Elev.: 12ft.
Tarmac 2,107 x 60 yds. Distance from Bangkok, 10 miles.
1 runway.

Electro-Pneumatic, Hydraulic and Fuel Valves, Pneumatic Jacks, Pressure Switches and Control Valves, Thermostatic Inching Controls, Cabin Heater and Temperature Control Equipment, Seamless Metal Bellows and Packless Glands, Time Switches.

TEDDINGTON CONTROLS LTD.
CEFN COED, MERTHYR TYDFIL, SOUTH WALES

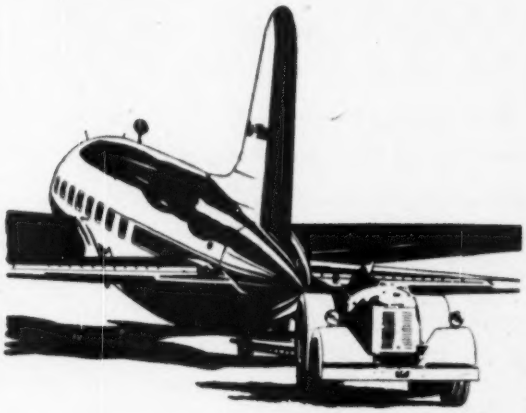
Ground Staffs know

that an aircraft spends more time on the ground than in the air.

Efficient air travel depends on smart ground organization, quick turn-around, speedy re-fuelling, freight loading—in short, economical handling at ground level.

That's the job of the David Brown TASK-MASTER, designed for just this work, with its powerful 39 b.h.p. engine, rugged construction and 6-point towing hitch. With a fast top speed of 22 m.p.h. the TASKMASTER has a first gear drawbar pull of 3,500 lb. and complies with the Road Traffic Act.

Write for our leaflet DBT. 161 or better still, let us arrange a demonstration on your own airfield.



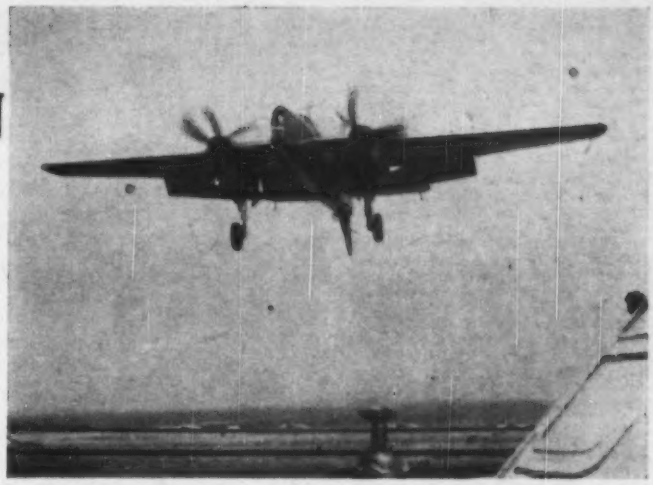
DAVID BROWN

Industrial Tractors

DAVID BROWN TRACTORS MELTHAM HUDDERSFIELD

SERVICE AVIATION

Royal Air Force and Naval Aviation News and Announcements



TARGET-TOWER: Pictured during recent deck-landing trials aboard H.M.S. *Illustrious*, this Short Sturgeon T.T.2 (two Rolls-Royce Merlin 140s) displays its arrester hook and large-area flaps. The remarkably slim fuselage of this two-seat Naval target-towing aircraft may also be appreciated.

Deputy Master of the Household

GROUP CAPTAIN PETER TOWNSEND, C.V.O., D.S.O., D.F.C., Equerry to the King, has been appointed Deputy Master of the Household and is thus responsible, under Sir Piers Legh, for the running of internal affairs at Buckingham Palace.

Pioneer Pilot Murdered

THE death is reported from South Africa of Rear-Admiral John Weston, D.S.C., said to have been the first British subject to possess, simultaneously, certificates as a balloonist, airship pilot and aeroplane pilot. The Admiral, who was 80, and his wife died on July 24th from injuries inflicted by two masked intruders on their farm.

Admiral Weston is believed to have been the first man to fly in South Africa: he piloted a Farman biplane, imported from America, at Kimberley, on June 22nd, 1911. During the first World War he served in the R.N.A.S.

KOREA-BOUND: Seen at London Airport on August 1st, when he left for the Far East by B.O.A.C. Argonaut, is A.V-M. C. A. Bouchier—back in uniform for his new appointment as H.M. Government observer in Korea.

Lee-on-Solent Display

THE Flag Officer Air (Home), Vice-Admiral Sir Reginald Portal, K.C.B., D.S.C., is holding an "At Home," with an associated air display at Lee-on-Solent, Hants, on Saturday, August 26th, at 1.30 p.m. The public are invited.

Handsome Donation

ON August 3rd, A.V-M. Sir John Cordingley received, on behalf of the R.A.F. Benevolent Fund, a cheque for over £1,000. Presented by the chairman of the R.A.F. Reserves Club, the sum was the proceeds of the Club's recent ball.

Belgian Holiday

A FLIGHT of four aircraft was to take 92 boys and girls from Hendon to Brussels on August 9th for a month's holiday as guests of the Royal Belgian Air Force. Arrangements were made in this country by the International Help for Children and the R.A.F. Benevolent Fund. The party includes children from Birmingham, Cardiff, Manchester, Sheffield, Leeds, Bradford, Rotherham, Salford and Swansea, all of whom lost their fathers in R.A.F. service.

Australian Auxiliaries

THE Royal Australian Air Force has taken several steps towards expansion of its reserve forces. An Active Citizen Air Force Reserve has been established to provide part-time annual and week-end training for 1,000 officers and 9,000 men. The Active Citizen Air Force itself, at present consisting of four squadrons, will be doubled by the addition of country flights at selected R.A.A.F. Stations. University air squadrons are also to be set up.

The most important step, however, is the decision to give 50 hours' free elementary flying training at clubs to 215 members of the General Reserve. Similar facilities will be afforded to 40 A.T.C. scholarship winners, new university air squadron members and *ab initio* recruits to the Active Citizen Air Force. The latter pupils will then continue advanced training on Service aircraft.

Vampires Visit Luxemburg

FIVE de Havilland Vampires of No. 72 Squadron, Fighter Command, were due to give a 20-minute aerobatic display last Sunday at the International aviation meeting organized by the Aero Club of the Grand Duchy of Luxemburg. Leading the R.A.F. detachment was S/L. D. E. Kingaby, D.S.O., D.F.M., Commanding Officer of 72 Squadron.

The fighters were to have flown to Luxemburg on Friday last, and a "show-the-flag" flight over the city was scheduled for Saturday, followed by entertainment for all ranks taking part

PROUD PARENT: Air Marshal Sir Hugh Walmsley, A.O.C.-in-C., Flying Training Command, with his newly commissioned son, P.O. I. H. F. Walmsley, after the Cranwell graduation parade referred to overleaf.

SERVICE AVIATION . . .

in the meeting. Pilots of No. 72 Squadron, which fought in the Battle of Britain, North Africa and Italy, claimed a total of 247 enemy aircraft destroyed during the war.

Halton Parade

ILLUSTRATIONS on p. 163 of this issue show the passing-out inspection, on August 1st, at No. 1 School of Technical Training, Halton, of the 57th Entry of Aircraft Apprentices. Marshal of the R.A.F. Viscount Trenchard was the reviewing officer, and he was accompanied by Air Marshal Sir John Whitworth Jones, the A.O.C.-in-C., Technical Training Command; A.V-M. R. O. Jones, A.O.C., 24 Group; A. Cdre. N. Carter, Commandant, R.A.F. Halton; G/C. N. C. S. Rutter, Senior Training Officer, No. 1. S. of T.T.; and W/C. B. Robinson, O.C. No. 2 (Apprentices) Wing.

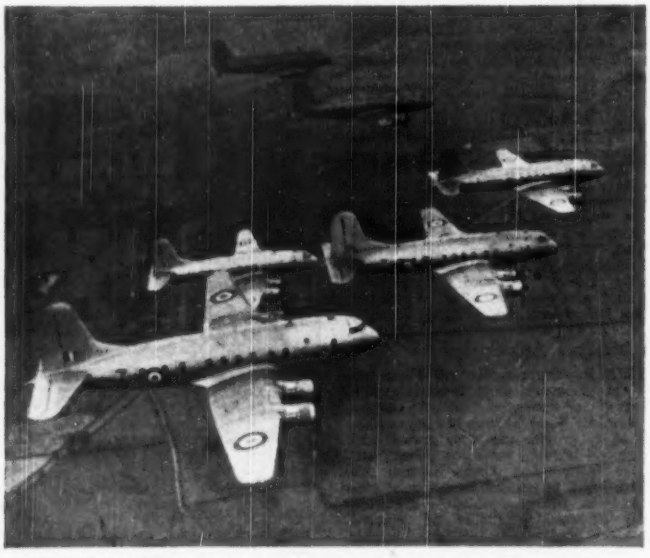
On the parade ground, the 57th Entry was supported by the 58th to 63rd Entries, together with the apprentices' own pipe, fife and military bands. F/Sgt. App/Air. E. T. J. Manning was in charge of the parade and Cpl. App/Air. B. Messenger headed the guard of honour. Prizes were awarded as follows:—

Highest in all subjects: Sgt. App/Air. A. R. Murray. Highest in general service efficiency: F/Sgt. App/Air. E. T. J. Manning. Highest in educational subjects: Sgt. App/Air. Murray. Highest in practical fitting test: Sgt. App/Air. R. I. Offord. Highest average for practical fitting over three years' course: Cpl. App/Air. J. A. D. Bradshaw. Highest in general studies: Sgt. App/Air. A. R. Murray.

The best tradesmen in the Central Trade Test Board examinations were: Fitter IIE—Cpl. App/Air. Bradshaw and App/Air. R. Johnston; fitter IIA—Ldg. App/Air. L. E. Usher and Cpl. App/Air. P. Large; electrician—Ldg. App/Air. R. R. Sharman; instrument maker—Sgt. App/Air. J. A. J. Willis; fitter armourer—Ldg. App/Air. A. Russell.

Members of the Entry, which began training on September 27th, 1947, are now posted to R.A.F. stations as fully qualified tradesmen.

CRANWELL GRADUATION: As reported on this page, the 50th Entry of Officer cadets graduated from the R.A.F. College recently. Winner of the Sword of Honour was F.C. U/Off. G. W. T. Charles; with him Cpl. E. V. Mellor (left), who received the King's Medal.



HASTINGS ON PARADE: Although formation work is not in their normal flying programme, this picture (secured during the R.A.F. Display fly-past) shows that Transport Command pilots have no difficulty whatever in "coping" when the occasion arises. The aircraft are Handley Page Hastings of No. 297 Squadron.

Chaplain's Retirement

DOYEN of the Chaplains' Branch of the Royal Air Force, the Rev. Archibald McHardy, C.B., C.B.E., D.D., Principal Church of Scotland Chaplain since 1928, has retired after over 30 years' service with the R.A.F. He was appointed a chaplain at Cranwell towards the end of 1919 and was among those who welcomed the first cadets at the R.A.F. College on its opening there in 1920. He was thus brought into close personal contact with most of the present high-ranking Air Force officers, whose careers he has watched with interest since their cadet days.

Born in 1890, Dr. McHardy took his M.A. degree in 1911 and was ordained shortly afterwards. He served as a private in the R.A.M.C. from September, 1914, and was a stretcher bearer in France from 1915 until commissioned as a chaplain in 1917. He was awarded the M.C. in 1919 for services in France.

C.A.S. at Cranwell

THE Chief of the Air Staff, Marshal of the R.A.F., Sir John Slessor, visited Cranwell on July 26th for the graduation of the 50th entry. Addressing the newly commissioned officers, the C.A.S. stressed the importance of leadership in the air and on the ground. Cranwell, he said, had, despite its comparative youth, a magnificent tradition of producing leaders of men, many of whom were near the top of the Service. There was ample evidence that the post-war Cranwell generation was living up to that standard.

Training, discipline, organization and morale were the four key words. Sir John Slessor did not think much was wrong with any of them in the Service today, as the Berlin Air Lift last year, and the Farnborough Display, more recently, had shown. But to keep them up to the mark it was essential that the leaders of the Service, on all levels, must constantly be thinking about how they could be improved.

A.V-M. G. R. Beamish, making his last address as Commandant, announced that recent entries were oversubscribed and it was to be hoped that the slump in suitable candidates for cadetships had passed.

Prizes and awards were presented by the C.A.S. as follows:—

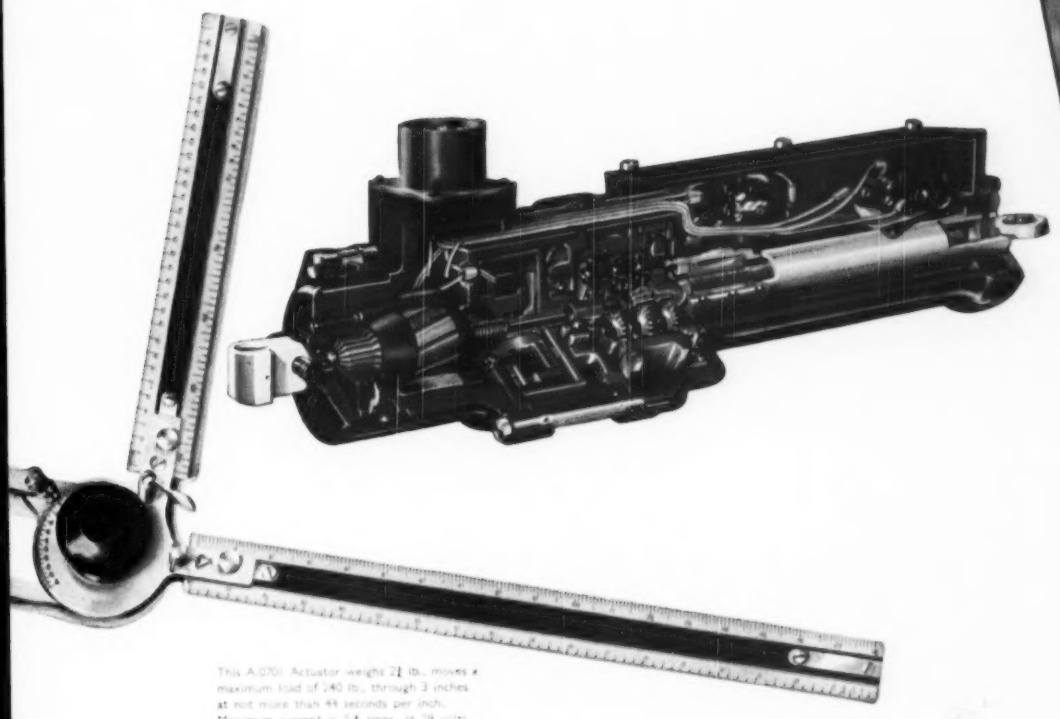
F.C. U/Off. G. W. T. Charles: Sword of Honour, H. M. Groves Memorial Prize, John Anthony Chance Prize. F.C. Cpl. E. V. Mellor: King's Medal, Dickson Trophy, Abdy Gerrard Fellowes Memorial Prize, Royal United Services Institute Award. F.C. Sgt. O. M. Cruikshank: Philip Sassoon Memorial Prize. F.C. Cpl. J. W. Price: Air Ministry Prize.

Reunions

NO. 166 Squadron and R.A.F. Kirkington.—Annual reunion at the Holyrood Hotel, Wells Street, London, W.1, on Saturday, October 21st at 1800 hr. Details from F. C. Tighe, Central Library, Porchester Road, London, W.C.2.

* * *

No. 3 S. of G.R. Old Comrades' Association (Squires Gate).—Fifth annual reunion at the Casino, Blackpool, on Saturday, October 7th. Details from A. C. M. Powell, "Monterey," 26, North Promenade, St. Annes-on-Sea, Lancs.



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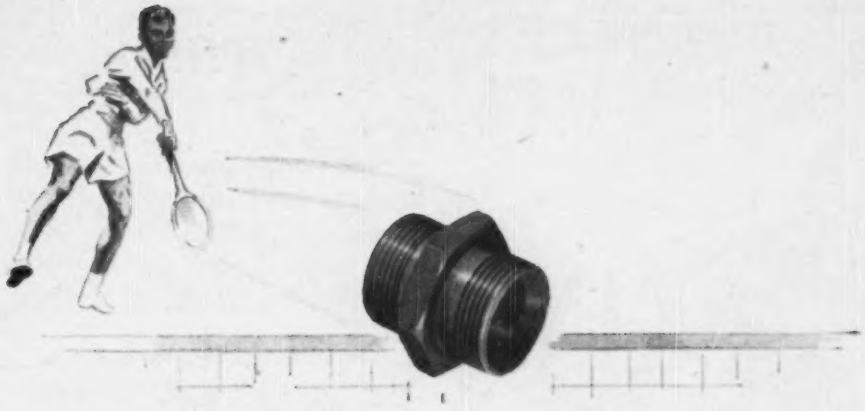

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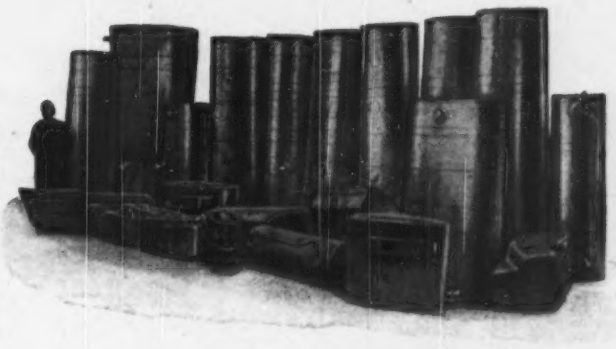

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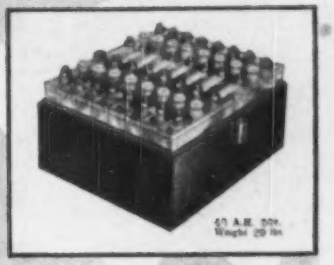

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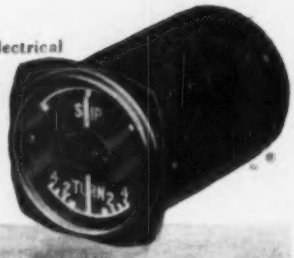

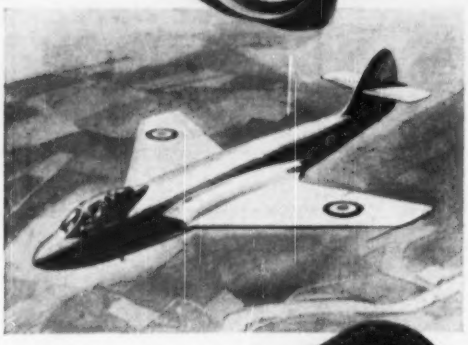

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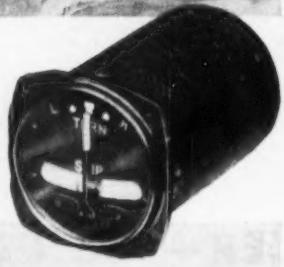

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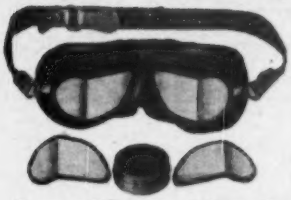

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